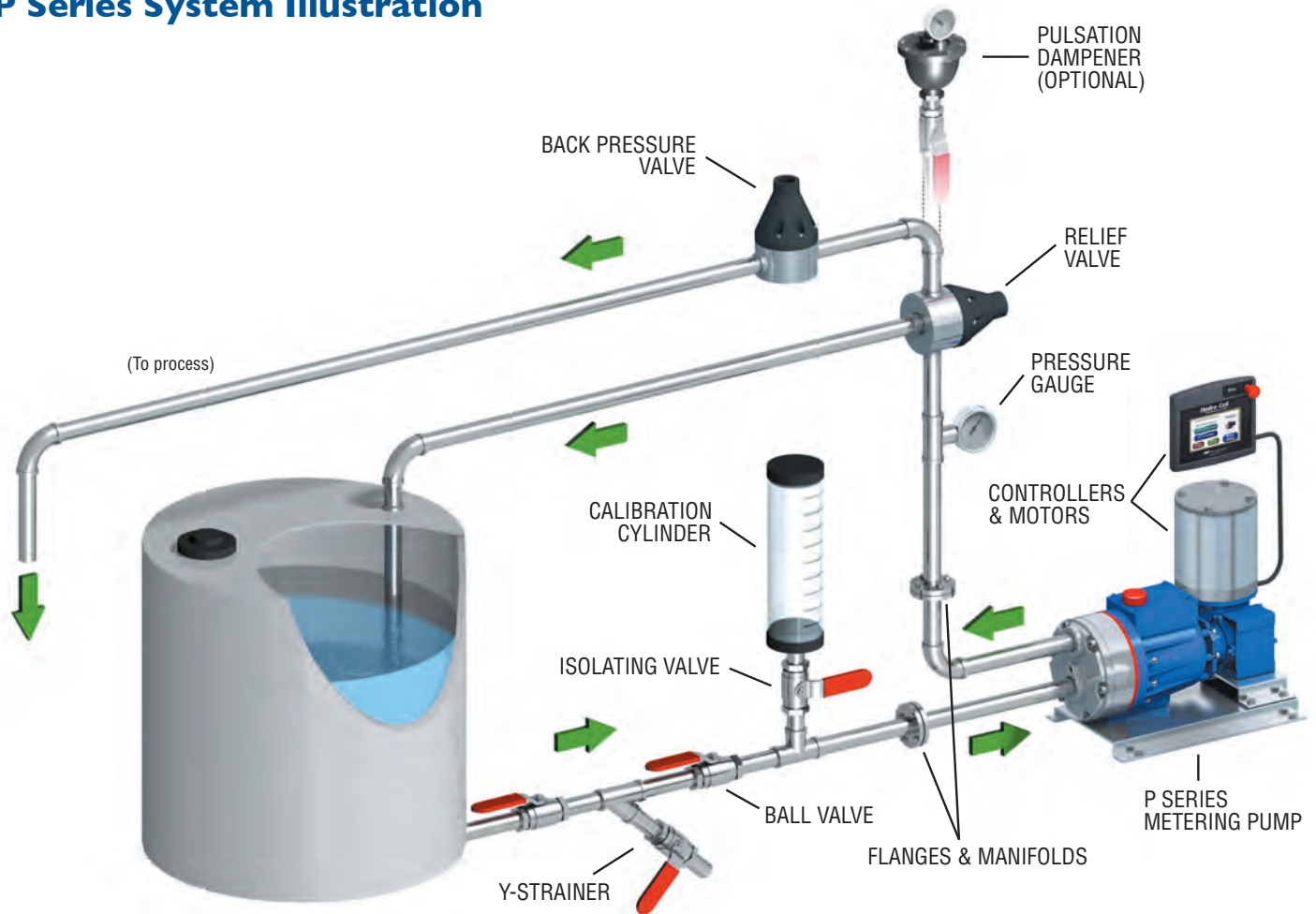


# Hydra-Cell® Metering Accessories and Options

## P Series System Illustration



### Accessory/Option

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## Pump Configuration

### Manifolds and Flanges



Pumps can be fitted with interchangeable metallic (Brass, Cast Iron, 316L Stainless Steel, Hastelloy C) or non-metallic (PVDF, Polypropylene) pump heads. ANSI, SAE, and DIN flanges are also available.

### SmartDrive Motor-Controller

Space-saving, integrated motor and variable speed drive. Eliminates remote mounting and provides convenient operation from one location. Available with NEMA or IEC frames. Optional keypad and network interface.



### Multiplexing Capability

Hydra-Cell Metering Solutions enables mixing ratios of multiple fluids in flexible, economical ways. Using only one motor and one gearbox, Hydra-Cell P Series pumps can provide spare, double-flow, side-by-side systems, or pre-mixed ratios. (They need not be the same model Hydra-Cell pumps.)

Up to six different fluids can be metered using different manifold plates. With special manifolds, one P200 or P300 unit can feed up to three systems from one liquid end.

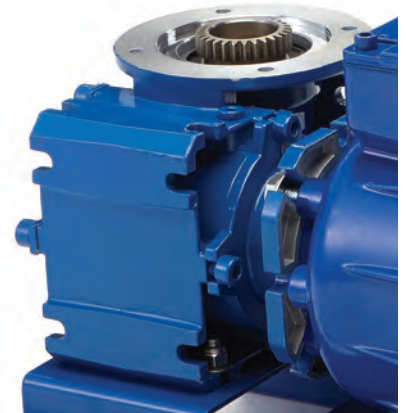


### Gearbox Ratios

Hydra-Cell Metering Solutions P Series pumps are fitted with interchangeable gearboxes with ratios from 60:1 to 5:1.

### Base Plates

Base plates are available in epoxy-painted Carbon Steel and (depending on model) 316L Stainless Steel.



### Oil Systems and Kits

Oil cooler and filter system reduces oil operating temperature, extends oil life, and promotes longevity of pump components.

Oil level monitoring mounting kits detect changes in the oil level to minimize costly interruptions and avoid potential pump damage.

Oil reservoir sight bottles provide additional volume for oil expansion and allow for quick visual inspection of oil.

*For complete details about oil systems and kits, consult the Hydra-Cell Seal-less Pumps master catalog.*

## Actuating Oils

### Hydra-Oil

Hydra-Oil is specially formulated to maximize performance of Hydra-Cell Metering Solutions pumps by reducing wear and maintaining consistent viscosity. Standard grades, synthetic grades, food-contact grades, and EPDM-compatible grades are available to suit the process requirement (e.g. temperature, pressure).

*For complete details about Hydra-Oil, consult the Hydra-Cell Seal-less Pumps master catalog.*

### Mesamoll Oil

Mesamoll oil offers outstanding gelling capacity and high saponification resistance along with good dielectric properties and resistance to weathering and light. It is ideal for use with many types of polymers and in instances where it will come into contact with water or an alkali. Mesamoll Oil is a standard offering for P200 model pumps with Aflas diaphragms, PTFE O-rings, and FKM drive case elastomers.

# Motors and Controllers

## Motors

Motors provide the rotary action that operates the gear reducer on a Hydra-Cell Metering Solutions pump. A motor for a specific P Series pump model is selected based on the horsepower (hp), revolutions-per-minute (rpm) and turndown ratio required for the application (performance criteria).

### Selection Process

1. Locate the Maximum flow at Designated Pressure (gph) for your application in the Performance table of your P Series pump model (P100, P200, etc.) beginning on page 16.
2. This maximum flow rate corresponds to a color-coded rating of your Required Motor hp.
3. Make sure that the hp and rpm match the frame and reducer per the chart at right.
4. Using the charts on pages 33 and 34, for either 1800 rpm or 3600 rpm, select the motor by matching the Required Motor hp with the correct turndown ratio of your pump.

### Motor Horsepower (HP), Pump Speed (RPM) and Frame Guidelines

P100	HP	RPM	FRAME	REDUCER CODE
	up to 1	1800	NEMA 56C	0XX
	up to 1	3600	NEMA 56C	0XX
P200	HP	RPM	FRAME	REDUCER CODE
	up to 1	1800	NEMA 56C	0XX
	up to 1	3600	NEMA 56C	0XX
	up to 1-1/2	3600	NEMA 56C	AXX
P300	HP	RPM	FRAME	REDUCER CODE
	up to 1	1800	NEMA 56C	0XX
	up to 1	3600	NEMA 56C	0XX
	1-1/2 or 2	1800	NEMA 56C	0XX
	1-1/2 or 2	1800	NEMA 143/5TC	AXX
	1-1/2 or 2	3600	NEMA 143/5TC	AXX
	3	3600	NEMA 143/5TC	AXX
P400	HP	RPM	FRAME	REDUCER CODE
	up to 1	1800	NEMA 56C	0XX
	up to 1	3600	NEMA 143/5TC	AXX
	1-1/2 or 2	1800	NEMA 56C	0XX
	1-1/2 or 2	1800	NEMA 143/5TC	AXX
	1-1/2 or 2	3600	NEMA 143/5TC	AXX
	3	3600	NEMA 143/5TC	AXX
P500	HP	RPM	FRAME	REDUCER CODE
	up to 1	1800	NEMA 56C	0XX
	up to 1	3600	NEMA 56C	0XX
	1-1/2 or 2	1800	NEMA 143/5TC	AXX
	1-1/2 or 2	3600	NEMA 143/5TC	AXX
	3 or 5	1800	NEMA 182/4TC	BXX
	3 or 5	3600	NEMA 182/4TC	BXX
	7-1/2 or 10	1800	NEMA 213/5TC	CXX
	7-1/2 or 10	3600	NEMA 213/5TC	CXX
	15	3600	NEMA 254/6TC	DXX
P600	HP	RPM	FRAME	REDUCER CODE
	up to 1	1800	NEMA 56C	0XX
	up to 1	3600	NEMA 143/5TC	AXX
	1-1/2 or 2	1800	NEMA 143/5TC	AXX
	1-1/2 or 2	3600	NEMA 143/5TC	AXX
	3 or 5	1800	NEMA 182/4TC	BXX
	3 or 5	3600	NEMA 182/4TC	BXX
	7-1/2 or 10	1800	NEMA 213/5TC	CXX
	7-1/2 or 10	3600	NEMA 213/5TC	CXX
	15	3600	NEMA 254/6TC	DXX

## Motors

### 1800 rpm Inverter Duty - 3 Phase

HP	Voltage	Turndown Ratio	Frame	Enclosure	Drip Cover	Part Number	Weight (lbs.)
1/4	230	1000:1	56C	TENV		M25TE183P56C	18
1/2	230/460	1000:1	56C	TENV		M50TE183P56C	20
1/2	230/460	1000:1	56C	Washdown/TENV		M50WD18R3P56CA5	25
3/4	230/460	20:1	56C	TEFC		M75TE183P56CP	21
1	230/460	10:1	143TC	TEFC	Yes	M100TE18R3P143TCA3	59
1	230/460	1000:1	56C	Washdown/TENV		M100WD18R3P56CA5	34
1	230/460	1000:1	143TC	TENV*		M100TN18R3P143TCA5	50
1-1/2	230/460	2:1	56C	TEFC		M150TE183P56CP	29
1-1/2	230/460	10:1	145TC	TEFC	Yes	M150TE18R3P145TCA3	38
1-1/2	230/460	1000:1	145TC	TENV*		M150TN18R3P145TCA5	48
2	230/460	4:1	56C	TEFC*		M200TE18R3P56CA2	41
2	230/460	10:1	145TC	TEFC	Yes	M200TE18R3P145TCA3	44
2	230/460	20:1	145TC	TEFC		M200TE18R3P145TCA4	51
3	230/460	10:1	182TC	TEFC	Yes	M300TE18R3P182TCA3	125
3	230/460	20:1	182TC	TEFC		M300TE18R3P182TCA4	86
5	230/460	10:1	184TC	TEFC	Yes	M500TE18R3P184TCA3	125
5	230/460	20:1	184TC	TEFC		M500TE18R3P184TCA4	88
7-1/2	230/460	10:1	213TC	TEFC	Yes	M750TE18R3P213TCA3	185
7-1/2	230/460	20:1	213TC	TEFC		M750TE18R3P213TCA4	98
10	230/460	10:1	215TC	TEFC	Yes	M1000TE18R3P215TCA3	185
10	230/460	20:1	215TC	TEFC		M1000TE18R3P215TCA4	125
15	230/460	10:1	254TC	TEFC	Yes	M1500TE18R3P254TCA3	310

\* With Removable Feet

Use washdown or motors with a drip cover for outside installations.

### 3600 rpm Inverter Duty - 3 Phase

HP	Voltage	Turndown Ratio	Frame	Enclosure	Drip Cover	Part Number	Weight (lbs.)
1	230/460	10:1	56C	TEFC		M100TE36R3P56CA3	34
1	230/460	1000:1	56C	Washdown/TENV		M100WD36R3P56CA5	34
1	230/460	10:1	143TC	TEFC	Yes	M100TE36R3P143TCA3	59
1-1/2	230/460	10:1	143TC	TEFC	Yes	M150TE36R3P143TCA3	59
2	230/460	10:1	145TC	TEFC	Yes	M200TE36R3P145TCA3	65
3	230/460	10:1	182TC	TEFC	Yes	M300TE36R3P182TCA3	100
5	230/460	10:1	184TC	TEFC	Yes	M500TE36R3P184TCA3	120
7-1/2	230/460	10:1	213TC	TEFC	Yes	M750TE36R3P213TCA3	175
10	230/460	10:1	215TC	TEFC	Yes	M1000TE36R3P215TCA3	198
15	230/460	10:1	254TC	TEFC	Yes	M1500TE36R3P254TCA3	310

Use washdown or motors with a drip cover for outside installations.

## Explosion-proof Motors

Consult the National Electric Code and your local regulations for proper selection of motors in hazardous locations.

### Hazardous Duty Location, NEMA 56C, Footed, 3 Phase

HP	RPM	Frame	Part Number	Turndown Ratio (CT)	Enclosure	Voltage/Hz	Weight (lbs.)
1/4	1800	56C	M25EX18F3P56CA5	1000:1	TENV	230-460/60	26
1/2	1800	56C	M50EX18F3P56CA5	1000:1	TENV	230-460/60	31
3/4	1800	56C	M75EX18F3P56CA5	1000:1	TENV	230-460/60	38
1	1800	56C	M100EX18F3P56CA5	1000:1	TENV	230-460/60	43

#### Standard Features:

- Class I and II, Groups C, D, F & G
- CSA certified
- UL listed
- Continuous duty at 104°F (40°C) ambient

### Hazardous Duty Location, NEMA, No Feet, 3 Phase

HP	RPM	Frame	Part Number	Turndown Ratio (CT) <sup>(1)</sup>	Shipping Weight (lbs.)
1	1800	143TC	M100EX18R3P143TCA2	4:1	68
2	3600	145TC	M200EX36R3P145TCA2	4:1	110
2	1800	145TC	M200EX18R3P145TCA2	4:1	110
3	3600	182TC	M300EX36R3P182TCA2	4:1	150
3	1800	182TC	M300EX18R3P182TCA2	4:1	150
5	3600	184TC	M500EX36R3P184TCA2	4:1	170
5	1800	184TC	M500EX18R3P184TCA2	4:1	160
7.5	3600	213TC	M750EX36R3P213TCA2	4:1	230
7.5	1800	213TC	M750EX18R3P213TCA2	4:1	250
10	3600	215TC	M1000EX36R3P215TCA2	4:1	285
10	1800	215TC	M1000EX18R3P215TCA2	4:1	325

Contact factory if higher turndown ratios are required.

Contact factory if operating above 3300-ft. elevation.

#### Standard Features:

- Totally enclosed fan cooled - explosion proof (IP55), continuous-duty, 230/460V, 60 Hz, 3 phase, I. I.5 S.F.
- UL and CSA listed for Class I, Division I, Group C & D and Class II, Groups E, F, G: Temp Code T3B
- Cast-iron construction, premium efficiency
- UL listed for inverter duty (motor service factor 1.0 when operated with VFD)
- Class "F" insulation with Class "B" rise

# Variable Frequency Drives (VFD) and Controllers

Hydra-Cell Metering Solutions pumps feature VFD electronic controllers to regulate the motor speed and strokes-per-minute, providing a flow that is proportional to the motor speed. They are selected based on the motor hp and whether single-phase or three-phase voltage is required.



## Selection Process

1. Ensure that the phase and enclosure match your application.
2. Using the appropriate chart below, select the controller hp based on the hp of your motor.
3. Match the output voltage to the output voltage of your motor.
4. Match the input voltage to your electrical source.

### 1 Phase

HP	Type	Voltage (input/output)	Enclosure	Part Number	Weight (lbs.)
1/2	Sensorless Vector	230 volt / 230 volt	NEMA 1	C50N1-1P3P-230	2.2
1	Sensorless Vector	115 volt / 230 volt	IP-20	C100IP-1P3P-115	3.5
1	Micro AC Inverter	115 volt / 230 volt	NEMA 4	C100N4-1P3P-115	8.0
1	Sensorless Vector	230 volt / 230 volt	NEMA 1	C100N1-1P3P-230	2.2
1	Micro AC Inverter	230 volt / 230 volt	NEMA 4	C100N4-1P3P-230	8.0
2	Sensorless Vector	230 volt / 230 volt	NEMA 1	C200N1-1P3P-230	4.4
3	Sensorless Vector	230 volt / 230 volt	NEMA 1	C300N1-1P3P-230	4.4

### 3 Phase

HP	Type	Voltage (input/output)	Enclosure	Part Number	Weight (lbs.)
1/2	Sensorless Vector	230 volt / 230 volt	NEMA 1	C50N1-3P3P-230	2.2
1	Sensorless Vector	230 volt / 230 volt	NEMA 1	C100N1-3P3P-230	2.2
2	Sensorless Vector	230 volt / 230 volt	NEMA 1	C200N1-3P3P-230	4.4
2	Micro AC Inverter	230 volt / 230 volt	NEMA 4	C200N4-3P3P-230	14.0
3	Sensorless Vector	230 volt / 230 volt	NEMA 1	C300N1-3P3P-230	4.4
5	Sensorless Vector	230 volt / 230 volt	NEMA 1	C500N1-3P3P-230	5.0
7-1/2	Sensorless Vector	230 volt / 230 volt	NEMA 1	C750N1-3P3P-230	13.0
10	Sensorless Vector	230volt / 230 volt	NEMA 1	C1000N1-3P3P-230	13.0
1	Sensorless Vector	460 volt / 460 volt	NEMA 1	C100N1-3P3P-460	2.2
1	Micro AC Inverter	460 volt / 460 volt	NEMA 4	C100N4-3P3P-460	13.0
2	Sensorless Vector	460 volt / 460 volt	NEMA 1	C200N1-3P3P-460	2.2
2	Micro AC Inverter	460 volt / 460 volt	NEMA 4	C200N4-3P3P-460	14.0
3	Sensorless Vector	460 volt / 460 volt	NEMA 1	C300N1-3P3P-460	4.4
5	Sensorless Vector	460 volt / 460 volt	NEMA 1	C500N1-3P3P-460	4.4
7-1/2	Sensorless Vector	460 volt / 460 volt	NEMA 1	C750N1-3P3P-460	14.0
10	Sensorless Vector	460 volt / 460 volt	NEMA 1	C1000N1-3P3P-460	14.0
15	Sensorless Vector	460 volt / 460 volt	NEMA 1	C1500N1-3P3P-460	14.0
20	Sensorless Vector	460 volt / 460 volt	NEMA 1	C2000N1-3P3P-460	28.0
30	Sensorless Vector	460 volt / 460 volt	NEMA 1	C3000N1-3P3P-460	30.0

# Control Freak™ Touch-screen Metering Controller



Start-up menu options.

“Control Freak” is an exclusive new electronic controller that provides motor speed control for Hydra-Cell Metering Solutions pumps (or select Hydra-Cell bare shaft pumps) with an easy-to use touch-screen display and built-in programming.

The user can enter the desired flow rate or volume in gallons or liters and system pressure in psi or bar; and the controller automatically runs the pump manually at desired flow rate or volume total/time, or in pre-set batches.

The versatile Control Freak enables programming for the flow rate or for totalization of the recent process application as well as the life of the pump.



Opening screen - touch to activate.



Sample menu for batch operation.

## Performance Features

- Features a Variable Frequency Drive (VFD) available in different hp (or kW) ratings
- Pre-set (with password protection) for Hydra-Cell pump performance algorithms - can also be field-calibrated for greater accuracy
- 7” color graphic touch-screen user interface in a NEMA-4X (or IP) enclosure - easy to operate and visible in low-light areas
- Safety features for emergency stop, loss of power and fault monitoring
- Pump-drive information screen
- Four configurable on-off relays
- Ten separate batch set-up screens
- Two user-configurable analog input displays
- Analog and digital I/O for interfacing with external devices
- One analog input dedicated to a pre-programmed closed loop feedback
- Includes real-time clock
- Versatile - enables programming for flow rate or totalization
- Can control up to six (6) pumps with one Hydra-Cell Control Freak screen - requires additional VFDs and I/O modules

## Options

- Ball-mount assembly for touch screen
- VFD enclosure
- Additional cables
- Oil temperature probe kit

## Control Freak Selection Process

Control Freak enables control of up to six pumps from one touch-screen. A complete Control Freak unit is comprised of Touch-screen Kit (Number 150-150) plus one or more VFD kits.

### Touch-screen Kit (required)

Kit Number	Contents
150-150	7" Touch-screen Assembly Cable, CAT5e, 7-ft.

#### Each VFD kit includes:

- Appropriate VFD model in chart to left
- I/O Module, Single Pump
- Wiring, I/O Module
- Wiring, Motor, 22 ga., 1-ft., Red
- Wiring, Motor, 22 ga., 1-ft., White
- Cable, CAT5e, 1-ft.



### VFD Kits (order one VFD kit for each pump operated by the Control Freak)

Power	Type	Input Voltage/Phase	Output Voltage/Phase	Kit Number
1/2 hp (0.37 kW)	VFD	115 volt/1-phase	230/460 volt/3-phase	150-250
1/2 hp (0.37 kW)	VFD	230 volt/1-phase	230/460 volt/3-phase	150-251
1 hp (0.75 kW)	VFD	115 volt/1-phase	230/460 volt/3-phase	150-252
1 hp (0.75 kW)	VFD	230 volt/1-phase	230/460 volt/3-phase	150-253
2 hp (1.5 kW)	VFD	230 volt/1-phase	230/460 volt/3-phase	150-254
3 hp (2.2 kW)	VFD	230 volt/1-phase	230/460 volt/3-phase	150-255
1/2 hp (0.37 kW)	VFD	230 volt/3-phase	230/460 volt/3-phase	150-256
1 hp (0.75 kW)	VFD	230 volt/3-phase	230/460 volt/3-phase	150-257
2 hp (1.5 kW)	VFD	230 volt/3-phase	230/460 volt/3-phase	150-258
3 hp (2.2 kW)	VFD	230 volt/3-phase	230/460 volt/3-phase	150-259
1 hp (0.75 kW)	VFD	460 volt/3-phase	230/460 volt/3-phase	150-264
2 hp (1.5 kW)	VFD	460 volt/3-phase	230/460 volt/3-phase	150-265
3 hp (2.2 kW)	VFD	460 volt/3-phase	230/460 volt/3-phase	150-266

For higher hp or kW, please consult factory.

### Control Freak Accessories

Accessory	Description	Part Number
Enclosure (1)	VFD Enclosure for up to 1 hp (0.75 kW)	150-005
Probe Kit	Oil Temperature Sensor Probe with Oil Cap	150-006
Ball Mount Assembly	Bracket Ball, Ball Mount Hinge, Screw, Nut	150-030
Cabling	1-ft. CAT5e Cable	150-401
Cabling	3-ft. CAT5e Cable	150-403
Cabling	7-ft. CAT5e Cable	150-407
Cabling	10-ft. CAT5e Cable	150-410
Cabling	30-ft. CAT5e Cable	150-430

(1) Consult Factory for larger VFDs and for pricing on equipment mounting in enclosure.





# Calibration Cylinders

The calibration cylinder verifies the flow rate of your Hydra-Cell metering pump, providing a visual indicator that your system is operating within the required parameters for performance and accuracy.

Available in PVC and glass, calibration cylinders are selected based on cylinder capacity needed (gph or lph) as determined by the maximum shaft rpm of your pump. Models are available for both NPT and BSPT ports.

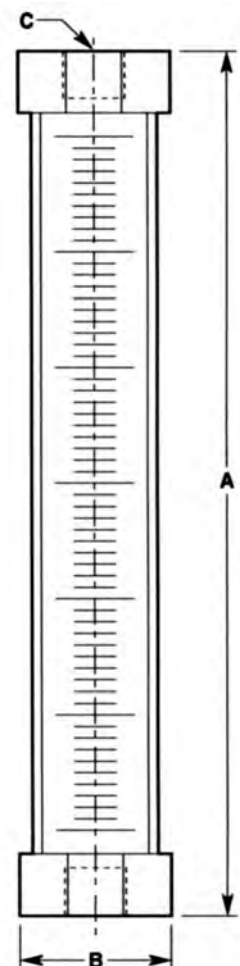
## Selection Process

1. Size the appropriate P Series pump to the application (refer to pump specifications for complete information).
2. Use the application rpm to select the appropriate cylinder from the chart below.



Cylinder Size					
mL	30	200	1000	2000	10000
Capacity					
gph	0.95	6.4	32	64	320
lph	3.6	24	120	240	1200
Pump Model	Maximum Pump Shaft (rpm)				
P100 (F20)	36	200	1000	1750	-
P200 (M03)	-	75	300	600	1750
P300 (D04)	-	75	300	600	1750
P400 (D10)	-	30	110	210	1000
P500 (D15/D17)	-	-	60	115	600
P600 (H25)	-	-	30	60	275

Port C	Cylinder Size (mL)	Part Number		Dimensions - in (mm)	
		NPT Ports	BSPT Ports	A	B
PVC Cylinders					
1/2"	200	111-001	111-001-B	19.0 (482.6)	1.5 (38.1)
3/4"	1000	111-003	111-003-B	22.0 (558.8)	2.5 (63.5)
1"	2000	111-004	111-004-B	20.0 (508.0)	3.7 (94.0)
2"	10000	111-006	111-006-B	25.0 (635.0)	6.95 (176.5)
Glass Cylinders					
1/4"	30	111-010	111-010-B	14.0 (355.6)	1.4 (35.6)
1/2"	200	111-011	111-011-B	21.0 (533.4)	2.5 (63.5)
3/4"	1000	111-013	111-013-B	27.0 (685.8)	3.5 (88.9)
1"	2000	111-014	111-014-B	27.0 (685.8)	5.0 (127.0)



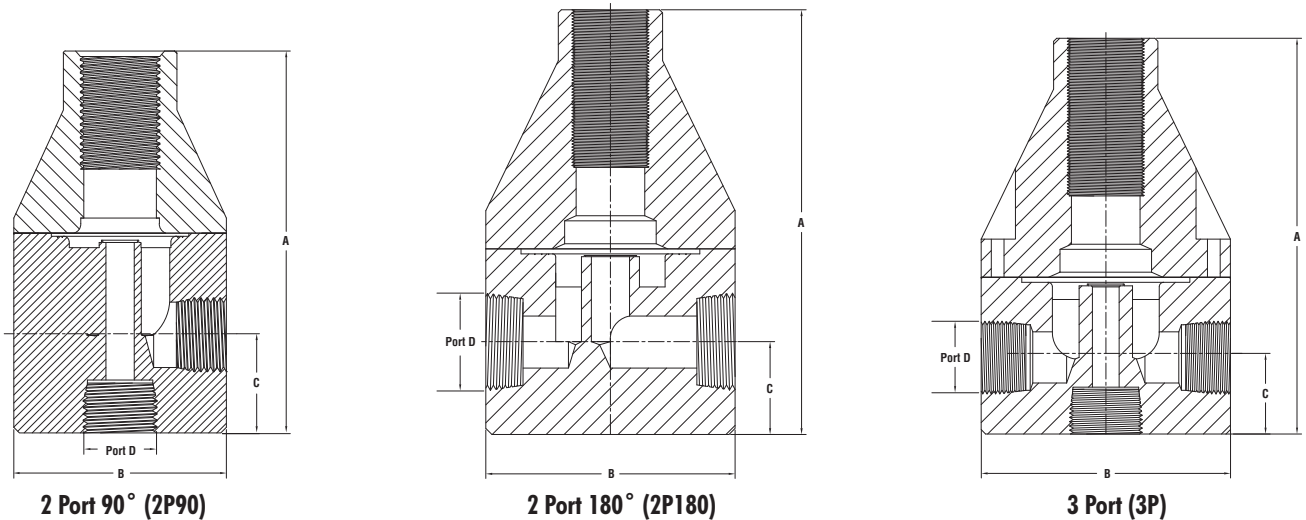
# Back Pressure and Pressure Relief Valves

Back pressure valves help ensure that your Hydra-Cell metering pump provides accurate and predictable flow. Pressure relief valves protect your pump and system from over-pressurized situations.

Available in a choice of wetted materials with PTFE diaphragms, pressure valves are selected according to the valve port size needed for the appropriate maximum flow (gph or lph) of your Hydra-Cell metering pump. Models are available for both NPT and BSPT ports.



## Dimensions and Port Configurations



Material	Port D	A		B		C	
		in	mm	in	mm	in	mm
Polypropylene/PVDF	3/8" (DN 10)	3.55	90.2	2.35	59.7	0.75	19.1
	1/2" (DN 15)	4.25	108.0	2.35	59.7	1.10	27.9
	3/4" (DN 20)	5.56	141.2	3.50	88.9	1.125	28.6
	1" StdFlo (DN 25)	5.86	148.8	3.50	88.9	1.25	31.8
	1" HiFlo (DN 25)	7.25	184.2	4.90	124.5	1.25	31.8
	2" (DN 50)	8.90	226.1	4.90	124.5	2.15	54.6
316 SST	1/4" High Pressure (DN 8)	4.25	108.0	2.35	59.7	1.10	27.9
	3/8" (DN 10)	3.55	90.2	2.35	59.7	0.75	19.1
	3/8" High Pressure (DN 10)	4.25	108.0	2.35	59.7	1.10	27.9
	1/2" (DN 15)	4.25	108.0	2.35	59.7	1.10	27.9
	1/2" High Pressure (DN 15)	4.25	108.0	2.35	59.7	1.10	27.9
	3/4" (DN 20)	5.56	141.2	3.50	149.9	1.125	28.6
	1" StdFlo (DN 25)	5.86	148.8	3.50	88.9	1.25	31.8
	1" HiFlo (DN 25)	7.25	184.2	4.90	124.5	1.25	31.8
	1" High Pressure (DN 25)	5.90	149.9	3.50	88.9	1.25	31.8
	2" (DN 50)	8.90	226.1	4.90	124.5	2.15	54.6
Hastelloy C	1/4" High Pressure (DN 8)	4.25	108.0	2.35	59.7	1.10	27.9
	3/8" (DN 10)	3.55	90.2	2.35	59.7	0.75	19.1
	3/8" High Pressure (DN 10)	4.25	108.0	2.35	59.7	1.10	27.9
	1/2" (DN 15)	4.25	108.0	2.35	59.7	1.10	27.9
	1/2" High Pressure (DN 15)	4.25	108.0	2.35	59.7	1.10	27.9
	3/4" (DN 20)	5.56	141.2	3.50	88.9	1.125	28.6
	1" StdFlo (DN 25)	5.86	148.8	3.50	88.9	1.25	31.8
	1" HiFlo (DN 25)	7.25	184.2	4.90	124.5	1.25	31.8
	1" High Pressure (DN 25)	5.90	149.9	3.50	88.9	1.25	31.8
	2" (DN 50)	8.90	226.1	4.90	124.5	2.15	54.6

# Back Pressure Valves

## Selection Process

1. Use the Valve Port Size “D” chart below to determine the valve port size with the appropriate maximum flow rate to match the Hydra-Cell pump selected; gpm and l/min are Continuous Flow; gph and lph are Pulsating Flow.

2. For Back Pressure Valves, use the chart on this page to select the appropriate valve. For Pressure Relief Valves, use the chart on the following page.

(Note: The maximum flow rates are guidelines. Consult factory for specific recommendations.)

## Valve Port Size “D”

		LoFlo		StdFlo			HiFlo		High Pressure	
		3/8"	1/2"	3/4"	1"	2"	3/4"	1"	1/4"-3/8"-1/2"	3/4"-1"
Maximum Flow		(DN 10)	(DN 15)	(DN 20)	(DN 25)	(DN 50)	(DN 20)	(DN 25)	(DN 8 - DN 10 - DN 15)	(DN 20 - DN 25)
Pulsating	gph	200	260	300	500	2350	600	1000	700	1200
	lph	757	984	1135	1890	8892	2271	3785	2650	4542
Continuous	gpm	10	15	21	26	120	30	54	35	60
	l/min	37	57	80	98	454	114	204	132	227

Port “D”	Wetted Materials*	Pressure Adjustment Range		Maximum Temperature		Port Configuration	Part Number	
		psi	bar	°F	°C		NPT Ports	BSPT Ports
3/8" LoFlo (DN 10)	Polypropylene	10 - 150	0.7 - 10.3	195	90	2P180	111-101	111-101-B
	PVDF	10 - 150	0.7 - 10.3	195	90	2P180	111-103	111-103-B
	316 SST	10 - 150	0.7 - 10.3	300	149	2P180	111-106	111-106-B
	Hastelloy C	10 - 150	0.7 - 10.3	300	149	2P180	111-110	111-110-B
	316 SST	50 - 350	3.5 - 24	300	149	2P180	111-107	111-107-B
	Hastelloy C	50 - 350	3.5 - 24	300	149	2P180	111-111	111-111-B
1/2" LoFlo (DN 15)	Polypropylene	10 - 150	0.7 - 10.3	195	90	2P180	111-121	111-121-B
	PVDF	10 - 150	0.7 - 10.3	195	90	2P180	111-123	111-123-B
	316 SST	10 - 150	0.7 - 10.3	300	149	2P180	111-126	111-126-B
	Hastelloy C	10 - 150	0.7 - 10.3	300	149	2P180	111-130	111-130-B
	316 SST	50 - 350	3.5 - 24	300	149	2P180	111-127	111-127-B
	Hastelloy C	50 - 350	3.5 - 24	300	149	2P180	111-131	111-131-B
3/4" StdFlo (DN 20)	Polypropylene	10 - 150	0.7 - 10.3	195	90	2P180	111-341	111-341-B
	PVDF	10 - 150	0.7 - 10.3	195	90	2P180	111-343	111-343-B
	316 SST	10 - 150	0.7 - 10.3	300	149	2P180	111-346	111-346-B
	Hastelloy C	10 - 150	0.7 - 10.3	300	149	2P180	111-350	111-350-B
1" StdFlo (DN 25)	Polypropylene	10 - 150	0.7 - 10.3	195	90	2P180	111-261	111-261-B
	PVDF	10 - 150	0.7 - 10.3	195	90	2P180	111-263	111-263-B
	316 SST	10 - 150	0.7 - 10.3	300	149	2P180	111-266	111-266-B
	Hastelloy C	10 - 150	0.7 - 10.3	300	149	2P180	111-270	111-270-B
	316 SST	50 - 350	3.5 - 24	300	149	2P180	111-267	111-267-B
	Hastelloy C	50 - 350	3.5 - 24	300	149	2P180	111-271	111-271-B
1" HiFlo (DN 25)	Polypropylene	10 - 150	0.7 - 10.3	195	90	2P180	111-361	111-361-B
	PVDF	10 - 150	0.7 - 10.3	195	90	2P180	111-363	111-363-B
	316 SST	10 - 150	0.7 - 10.3	300	149	2P180	111-366	111-366-B
	Hastelloy C	10 - 150	0.7 - 10.3	300	149	2P180	111-370	111-370-B
2" StdFlo (DN 50)	Polypropylene	10 - 150	0.7 - 10.3	195	90	2P180	111-281	111-281-B
	PVDF	10 - 150	0.7 - 10.3	195	90	2P180	111-283	111-283-B
	316 SST	10 - 150	0.7 - 10.3	300	149	2P180	111-286	111-286-B
	Hastelloy C	10 - 150	0.7 - 10.3	300	149	2P180	111-290	111-290-B
	316 SST	50 - 350	3.5 - 24	300	149	2P180	111-287	111-287-B
	Hastelloy C	50 - 350	3.5 - 24	300	149	2P180	111-291	111-291-B

\* Diaphragm material is PTFE on all models. Other materials available on request.

## Pressure Relief Valves

Port "D"	Wetted Materials*	Pressure Adjustment Range		Maximum Temperature		Port Configuration	Part Number	
		psi	bar	°F	°C		NPT Ports	BSPT Ports
1/4" High Pressure (DN 8)	316 SST	350 - 2500	24 - 172	300	149	2P90	111-800	111-800-B
	Hastelloy C	350 - 2500	24 - 172	300	149	2P90	111-804	111-804-B
3/8" LoFlo (DN 10)	Polypropylene	10 - 150	0.7 - 10.3	195	90	3P	111-401	111-401-B
	PVDF	10 - 150	0.7 - 10.3	195	90	3P	111-403	111-403-B
	316 SST	10 - 150	0.7 - 10.3	300	149	3P	111-406	111-406-B
	Hastelloy C	10 - 150	0.7 - 10.3	300	149	3P	111-410	111-410-B
	316 SST	50 - 350	3.5 - 24	300	149	3P	111-407	111-407-B
	Hastelloy C	50 - 350	3.5 - 24	300	149	3P	111-411	111-411-B
3/8" High Pressure (DN 10)	316 SST	350 - 2500	24 - 172	300	149	2P90	111-706	111-706-B
	Hastelloy C	350 - 2500	24 - 172	300	149	2P90	111-710	111-710-B
1/2" LoFlo (DN 15)	Polypropylene	10 - 150	0.7 - 10.3	195	90	3P	111-421	111-421-B
	PVDF	10 - 150	0.7 - 10.3	195	90	3P	111-423	111-423-B
	316 SST	10 - 150	0.7 - 10.3	300	149	3P	111-426	111-426-B
	Hastelloy C	10 - 150	0.7 - 10.3	300	149	3P	111-430	111-430-B
	316 SST	50 - 350	3.5 - 24	300	149	3P	111-427	111-427-B
	Hastelloy C	50 - 350	3.5 - 24	300	149	3P	111-431	111-431-B
1/2" High Pressure (DN 15)	316 SST	350 - 2500	24 - 172	300	149	2P90	111-726	111-726-B
	Hastelloy C	350 - 2500	24 - 172	300	149	2P90	111-730	111-730-B
3/4" StdFlo (DN 20)	Polypropylene	10 - 150	0.7 - 10.3	195	90	3P	111-541	111-541-B
	PVDF	10 - 150	0.7 - 10.3	195	90	3P	111-543	111-543-B
	316 SST	10 - 150	0.7 - 10.3	300	149	3P	111-546	111-546-B
	Hastelloy C	10 - 150	0.7 - 10.3	300	149	2P180	111-550	111-550-B
3/4" HiFlo (DN 20)	Polypropylene	10 - 150	0.7 - 10.3	195	90	2P180	111-641	111-641-B
	PVDF	10 - 150	0.7 - 10.3	195	90	2P180	111-643	111-643-B
	316 SST	10 - 150	0.7 - 10.3	300	149	2P180	111-646	111-646-B
	Hastelloy C	10 - 150	0.7 - 10.3	300	149	2P180	111-650	111-650-B
3/4" High Pressure (DN 20)	316 SST	350 - 2500	24 - 172	300	149	2P90	111-746	111-746-B
	Hastelloy C	350 - 2500	24 - 172	300	149	2P90	111-750	111-750-B
1" StdFlo (DN 25)	Polypropylene	10 - 150	0.7 - 10.3	195	90	3P	111-561	111-561-B
	PVDF	10 - 150	0.7 - 10.3	195	90	3P	111-563	111-563-B
	316 SST	10 - 150	0.7 - 10.3	300	149	3P	111-566	111-566-B
	Hastelloy C	10 - 150	0.7 - 10.3	300	149	2P180	111-570	111-570-B
	316 SST	50 - 350	3.5 - 24	300	149	3P	111-567	111-567-B
	Hastelloy C	50 - 350	3.5 - 24	300	149	2P180	111-571	111-571-B
1" HiFlo (DN 25)	Polypropylene	10 - 150	0.7 - 10.3	195	90	2P180	111-661	111-661-B
	PVDF	10 - 150	0.7 - 10.3	195	90	2P180	111-663	111-663-B
	316 SST	10 - 150	0.7 - 10.3	300	149	2P180	111-666	111-666-B
	Hastelloy C	10 - 150	0.7 - 10.3	300	149	2P180	111-670	111-670-B
1" High Pressure (DN 25)	316 SST	350 - 2500	24 - 172	300	149	2P180	111-766	111-766-B
	Hastelloy C	350 - 2500	24 - 172	300	149	2P90	111-770	111-770-B
2" StdFlo (DN 50)	Polypropylene	10 - 150	0.7 - 10.3	195	90	2P90	111-581	111-581-B
	PVDF	10 - 150	0.7 - 10.3	195	90	2P180	111-583	111-583-B
	316 SST	10 - 150	0.7 - 10.3	300	149	2P180	111-586	111-586-B
	Hastelloy C	10 - 150	0.7 - 10.3	300	149	2P180	111-590	111-590-B
	316 SST	50 - 350	3.5 - 24	300	149	2P180	111-587	111-587-B
	Hastelloy C	50 - 350	3.5 - 24	300	149	2P180	111-591	111-591-B

\* Diaphragm material is PTFE on all models. Other materials available on request.

# Pulsation Dampeners

Pulsation dampeners protect your pumping system and its components by removing virtually all hydraulic shock and vibration resulting from the reciprocating stroking action of a positive displacement pump.

Available in a variety of housing construction and bladder materials to cover different applications, pulsation dampeners are selected based on the size dampener (in cubic inches) needed to match your Hydra-Cell P Series pump model and discharge pulsation.

(Note: Since Hydra-Cell multiple-diaphragm model pumps provide smooth, virtually pulse-less linear flow, pulsation dampeners are recommended for P100 models, but are optional for all other models.)



## Selection Process

### Determine application

- Discharge pulsation (< 1000 psi or > 1000 psi)
- Inlet stabilization
  - High inlet pressure (>30 psi); or
  - Low inlet pressure (suction lift / <30 psi positive pressure)

### Select dampener size (cu. in. volume)

Based on the P Series pump model and application, select the appropriate cubic inch size from the chart at right.

### Select dampener model

Use the appropriate dampener size chart on pages 43 and 44 to select the specific model with the desired housing materials, bladder material, and pressure and temperature performance. (Contact Wanner Engineering for special order units with other construction materials and temperature limits.)

Air Control Pump Model	Application			
	Discharge Pulsation		Inlet Stabilization	
	Chargeable <1000 psi	Chargeable >1000 psi	Chargeable >30 psi	"J" Style <30 psi
<b>P100 (F20)</b>	4 cu. in.	12 cu. in.	4 cu. in.	10 cu. in.
<b>P200 (M03)</b>	4 cu. in.	12 cu. in.	4 cu. in.	10 cu. in.
<b>P300 (D04)</b>	4 cu. in.	12 cu. in.	4 cu. in.	10 cu. in.
<b>P400 (D10)</b>	4 cu. in.	12 cu. in.	4 cu. in.	10 cu. in.
<b>P500 (D15/D17)</b>	4 cu. in.	12 cu. in.	10 cu. in.	10 cu. in.
<b>P600 (H25)</b>	10 cu. in.	N/A	10 cu. in.	10 cu. in.

**Note:** These are minimum size recommendations. A larger size can always be used.

## Bladder Options

Bladder Material	Application Recommendations
Buna-N	Good flex life; use with petroleum, solvents, and oil-based fluids
Neoprene	Good abrasion resistance and flex; use with moderate chemicals
EPDM	Good for extreme cold; good chemical resistance with ketones, caustics
FKM	Good for hot and aggressive fluids; use with aromatics, solvents, acids, and oils
PTFE	Bellows design, excellent flex life; use with highly aggressive fluids

#### 4 Cubic Inch Dampeners: Inlet 1/2" (female)

Wetted	Bladder	Volume (Inch <sup>3</sup> )	Max Pressure		Part Number	
			psi	bar	NPT Ports	BSPT Ports
SST	Buna-N	4	1000	69	110-060	110-060-B
SST	Neoprene	4	1000	69	110-062	110-062-B
SST	EPDM	4	1000	69	110-063	110-063-B
SST	FKM	4	1000	69	110-065	110-065-B
SST	PTFE	4	600	41.4	110-068	110-068-B
Hastelloy C	Buna-N	4	1000	69	110-090	110-090-B
Hastelloy C	Neoprene	4	1000	69	110-092	110-092-B
Hastelloy C	EPDM	4	1000	69	110-093	110-093-B
Hastelloy C	FKM	4	1000	69	110-095	110-095-B
Hastelloy C	PTFE	4	600	41.4	110-098	110-098-B
Polypropylene	Buna-N	4	150	10.3	110-999	110-999-B
Polypropylene	Neoprene	4	150	10.3	110-101	110-101-B
Polypropylene	EPDM	4	150	10.3	110-104	110-104-B
Polypropylene	FKM	4	150	10.3	110-106	110-106-B
Polypropylene	PTFE	4	150	10.3	110-109	110-109-B
PVDF	Buna-N	4	150	10.3	110-020	110-020-B
PVDF	Neoprene	4	150	10.3	110-022	110-022-B
PVDF	EPDM	4	150	10.3	110-023	110-023-B
PVDF	FKM	4	150	10.3	110-026	110-026-B
PVDF	PTFE	4	150	10.3	110-028	110-028-B

#### 10 Cubic Inch Dampeners: Inlet 1/2" (female)

Wetted	Bladder	Volume (Inch <sup>3</sup> )	Max Pressure		Part Number	
			psi	bar	NPT Ports	BSPT Ports
SST	Buna-N	10	1000	69	110-260	110-260-B
SST	Neoprene	10	1000	69	110-262	110-262-B
SST	EPDM	10	1000	69	110-263	110-263-B
SST	FKM	10	1000	69	110-265	110-265-B
SST	PTFE	10	150	10.3	110-268	110-268-B
Hastelloy C	Buna-N	10	1000	69	110-290	110-290-B
Hastelloy C	Neoprene	10	1000	69	110-292	110-292-B
Hastelloy C	EPDM	10	1000	69	110-293	110-293-B
Hastelloy C	FKM	10	1000	69	110-295	110-295-B
Hastelloy C	PTFE	10	150	10.3	110-298	110-298-B
Polypropylene	Buna-N	10	150	10.3	110-100	110-100-B
Polypropylene	Neoprene	10	150	10.3	110-232	110-232-B
Polypropylene	EPDM	10	150	10.3	110-233	110-233-B
Polypropylene	FKM	10	150	10.3	110-105	110-105-B
Polypropylene	PTFE	10	150	10.3	110-108	110-108-B
PVDF	Buna-N	10	150	10.3	110-220	110-220-B
PVDF	Neoprene	10	150	10.3	110-222	110-222-B
PVDF	EPDM	10	150	10.3	110-223	110-223-B
PVDF	FKM	10	150	10.3	110-225	110-225-B
PVDF	PTFE	10	150	10.3	110-228	110-228-B

## 10 Cubic Inch Inlet Stabilizers with J-Style Control: Inlet 1/2" (female)

Wetted	Bladder	Volume (Inch <sup>3</sup> )	Max Pressure		Part Number	
			psi	bar	NPT Ports	BSPT Ports
CPVC	Buna-N	10	30	2	110-210-J	110-210-J-B
CPVC	Neoprene	10	30	2	110-212-J	110-212-J-B
CPVC	EPDM	10	30	2	110-213-J	110-213-J-B
CPVC	FKM	10	30	2	110-215-J	110-215-J-B
CPVC	PTFE	10	30	2	110-218-J	110-218-J-B

## 12 Cubic Inch Dampeners: Inlet 1/2" (female)

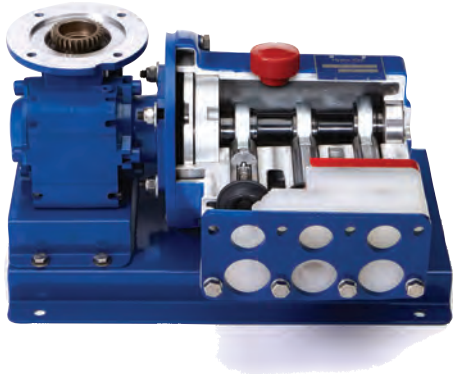
Wetted	Bladder	Volume (Inch <sup>3</sup> )	Max Pressure		Part Number	
			psi	bar	NPT Ports	BSPT Ports
SST	Buna-N	12	4000	276	110-370	110-370-B
SST	EPDM	12	4000	276	110-373	110-373-B
SST	FKM	12	4000	276	110-375	110-375-B
SST	PTFE	12	2000	138	110-368	110-368-B

## Pulsation Dampener Charging Kits

Part Number	Description
110-900	Pulsation Dampener Charging Kit to 999 psi (68.9 bar)
110-901	Pulsation Dampener Charging Kit 1000 to 5000 psi (69 to 345 bar)

# Other Services and Support

## Demonstration (Cutaway) Units



Description	Part Number
P200 Cutaway Demo with Rolling Carry Case	CUTAWAY-P200WCASE
P200 Cutaway Demo without Case	CUTAWAY-P200
Cutaway Demo Rolling Case Only	CUTAWAY-CASE

## Testing

Part Number	Description	Notes
TEST-STDPROD	Standard Production Tests	Rated Flow, Rated Pressure, & Steady State Accuracy
TEST-STDPRODWIT	Witnessed Standard Production Tests	Rated Flow, Rated Pressure, & Steady State Accuracy
TEST-HYDRO	Hydrostatic Test & Certificate	Includes Standard Production Tests
TEST-HYDROWIT	Witnessed Hydrostatic Test & Certificate	Includes Standard Production Tests
TEST-STDLIN	API Linearity Test (5-point curve)	Includes Standard Production Tests
TEST-STDLINWIT	Witnessed API Linearity Test (5-point curve)	Includes Standard Production Tests
TEST-STDLINREP	API Repeatability Test (10-point curve)	Includes Standard Production Tests & API Linearity Test
TEST-STDLINREPWIT	Witnessed API Repeatability Test (10-point curve)	Includes Standard Production Tests & API Linearity Test
TEST-STDHYDAPI	API Test Package	Standard Production Tests, Linearity, Repeatability, & Hydrostatic
TEST-STDHYDAPIWIT	Witnessed API Test Package	Standard Production Tests, Linearity, Repeatability, & Hydrostatic

## System Components

If needed, we can also deliver your Hydra-Cell Metering Solutions pumping system with all necessary strainers, suction accumulators, gauges, and other components.

## Priming Kits and Plugs

A vacuum priming kit is available for use after diaphragm replacement, and PVC priming plugs are used for priming the hydraulic cells in Hydra-Cell pumps equipped with patented Kel-Cell Diaphragm Position Control technology (models P400 and P600).

## Replacement Parts Kits and Tool Kits

Replacement Parts Kits are available for each P Series metering pump model and Hydra-Cell bare shaft pumps for metering. Complete tool kits are also available customized to the specific pump model.

## Factory Services

OEM paint and nameplate customization, drawing packages, and other special services are available.