

Volumetric Pump for 3rd Party Integration

Volumetric PCD Pump Integration into Third Party Dispense System

Applications: Silicones, Conductive Ink, Underfill, LED Encapsulation, Solder Mask, Grease, Conformal Coatings, and more

Progressive Cavity Displacement (PCD) Technology is a true “continuous volumetric” dispense technology able to accommodate a wide range of fluid viscosities - from water to mid-viscosity pastes. With a completely sealed system, there is no chance for drip or drool, even with the lowest viscosity fluids. There are three models of PCD pumps - they vary in dispense rate and minimum volume capability. The smallest model can dispense volumes down to 0.5 µl while the largest can dispense at rates up to 16 ml/min. Without the need to recharge, as is common with other volumetric technologies, the pump can dispense continuously over the largest patterns. PCD dispense technology exhibits total fluid control; even the lowest viscosity fluids can be accurately controlled.



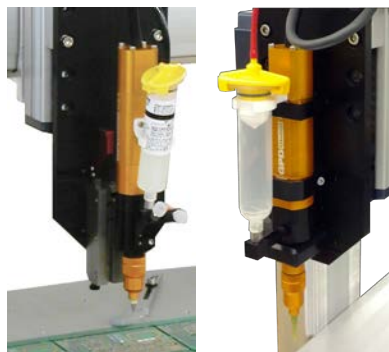
PCD Dispense technology is well suited for integration into systems with small or large volume requirements. Fluid may be fed from an external reservoir or from syringes (10 to 55 cc). For additional details about Volumetric PCD Pumps, refer to [Volumetric PCD Pumps](#) on our web site.

Volumetric Pump Integration Choices

Integrating any of the three PCD pump models into your existing process is easy with a choice of two ways to mount the pump and two methods of controlling it.

Simple mounting hardware that allows you to mount the pump to your system with a single bolt is included. Alternatively, Taper-Lock™ mounting hardware can be added for tool-less mounting.

Two control methods are available: a standalone, fully programmable controller and a control interface.



Taper-Lock™ Mount

Simple Mounting

Upgrade your dispensing robot with a Reliable, No Drip, No Drool, Volumetric Pump

Programmable Controller

The Programmable Controller incorporates an easy-to-read LCD screen and a control wheel for programming the pump and monitoring its status. Programming modes include a specific volume, a specific time or a start/stop mode. These programming modes are executed either by pressing the

START button on the front of the controller, pressing a foot switch, or when an input is received from an external control source. For non-automated applications, a pump stand is available (Figure 1). The stand holds the pump in virtually any orientation for manual operations like syringe filling, coating, or applications that require the operator to move the product.



Figure 1: PCD Pump with optional Pump Stand, Programmable Controller, Interface Cable, and Support Kit

For automation applications, the programmable controller can be triggered with an external signal through a user-sourced cable. The signal may originate from a Programmable Logic Controller (PLC) or another automated system (Figure 2).

When the programmable controller receives an input, it executes the currently displayed program. The most common form of pump control for automation integration is the start/stop mode. In this mode, the pump on/off is controlled by the control signal and allows for varying volumes at different locations, including dots or complex patterns.

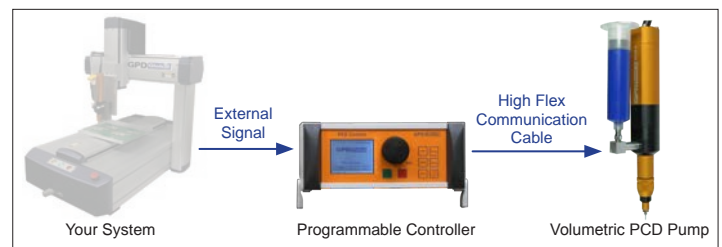


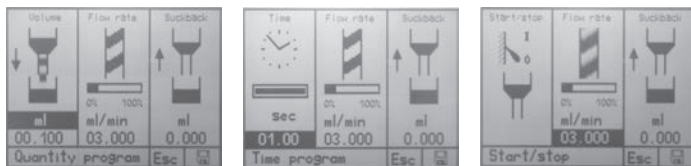
Figure 2: Standard Integration with automated machine

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Volumetric Pump Integration

The programmable controller has three programming modes:



Volume Dispense

Timed Dispense

User-Defined

- **Quantity** - pump dispenses the programmed volume at the programmed speed.
- **Time** - pump dispenses for the programmed time at the programmed speed.
- **Start/Stop** - pump dispenses from the time the START button is pressed (an input signal is received) until the STOP button is pressed (the signal is removed). This is the most common mode for interfacing with a machine/robot.

A reverse or suck back volume is available in each mode.

Up to 24 programs can be saved to an SD card for transfer to other controllers for programming consistency. The robot may select one of these programs with an optional program select module.

In addition, a single programmable controller can control up to two dispense pumps with an optional firmware update. When enabled, a single controller operates two PCD pumps in tandem using the same dispense parameters. This is ideal for doubling throughput for automation applications (Figure 3). To ensure volumetric consistency between the pumps, they can be individually calibrated. The controller records the calibration values and synchronizes the pumps to dispense the same volume.

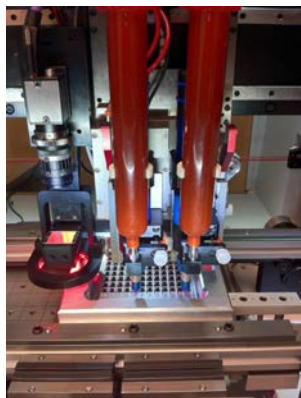


Figure 3: Tandem Pumps

To pressurize a syringe, the controller has a built-in regulator to moderate incoming pressure. The control unit displays the reservoir pressure but does not turn the air on/off. An incoming pressure of up to 6 bar (87 psi) can be connected to the control unit. When a large reservoir such as a pail is used, we recommend using an alternate pressurization device.

Interfacing the programmable controller and PCD pump is easily done with integration kits. These kits include everything needed for a simple integration (Figure 4): a PCD Series Volumetric Pump, a Programmable Controller, an Interface Cable between Controller and Pump, a Mounting Bracket, and a PCD Support Kit.



Figure 4: Integration Kit

(3D models of pump, controller, and mounting hardware are available for design purposes.)

Pump Mounting:

- Simple mounting is a clamp type that attaches to your system with a single bolt.
- Optional Tool-less Taper-Lock™ mounting provides a machine-side and pump-side interface where the pump can be mounted and removed with the push of a button.
- Optional Pump Stand for bench top use

Cabling:

- A 1.3 m high flex cable between the controller and pump is standard. Optional lengths up to 5 m are available.
- The control cable between the robot and controller is supplied by the customer. The programmable controller includes a connector to accept bare wire or wire with ferrules (Figure 5).

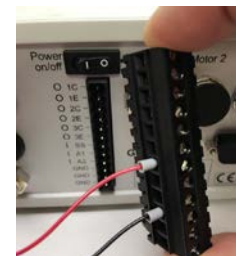


Figure 5: How connector wires attach

Control Signal:

- Through a user-supplied cable, a 24V signal from the robot initiates the selected program or starts/stops the pump when in the start/stop mode.
- For systems without the capability to send a 24V signal, we offer an optional interface to convert dry contacts to the required 24V.

Syringe Feed Pressure:

- When a regulated syringe pressure source is not available, the programmable controller has the ability to regulate an incoming air source and supply a constant syringe pressure.

For applications requiring volumes at the lower limits of pump specification (volume or flow rate), a high resolution controller and pump configuration are available. Please contact GPD Global for further details.

Volumetric Pump Integration

Direct Control Integration

Direct Control Integration offers the greatest flexibility in pump control. This interface requires the user's control system to supply a forward or reverse enable signal with a concurrent 0-10V variable voltage for speed. With Control Interface, all programming and control must be set up by the user.



Figure 6: Two Control Interface units mounted on a machine

With this integration method, your system has full/dynamic control of the motor. The pump can dynamically change velocity when traveling through corners or when a larger volume is required in a particular area. One controller operates a single pump; tandem operations require two controllers and two pumps.

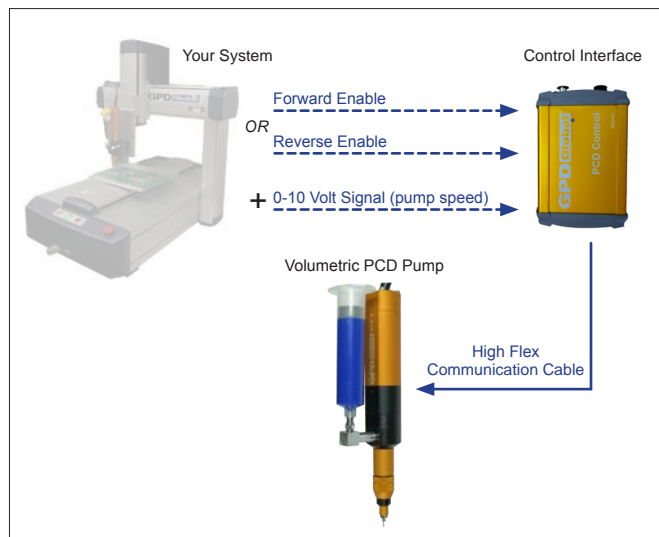


Figure 7: Direct Control Integration

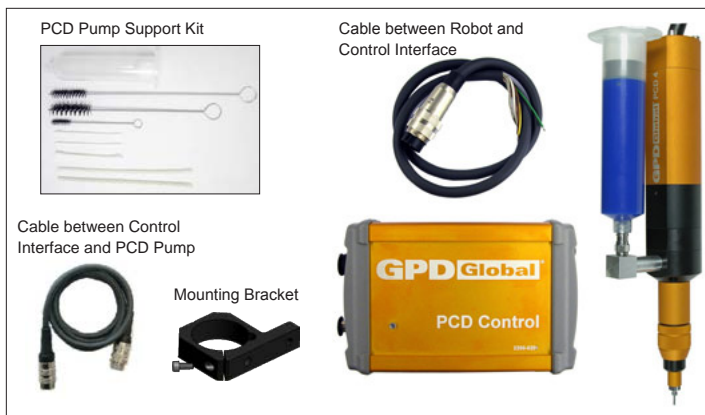


Figure 8: Direct Control Integration Kit

The Direct Control Integration Kit (Figure 8) includes all hardware needed for easy integration into your system: a PCD Series Volumetric Pump, a Control Interface, a Cable between controller and pump, a Cable between controller and robot, a Pump Mounting Bracket, and a PCD Support Kit.

(3D models of pump, controller and mounting hardware are available for design purposes)

Pump Mounting:

- Simple mounting is a clamp type that attaches to your system with a single bolt.
- Optional Tool-less Taper-Lock™ mounting provides a machine-side and pump-side interface where the pump can be mounted and removed with the push of a button.

Cabling:

- A 1.3 m high flex cable between the controller and pump is standard. Optional lengths up to 2.5 m are available.
- 0.6 m cable between the robot and controller

Control Signal:

- A 24V signal through the supplied cable enables forward/reverse motion while a concurrent 0-10V signal controls the speed.

Syringe feed pressure:

- Customer-supplied regulated pressure line is required.

Volumetric Pump Integration

Volumetric PCD Pumps

	PCD3H	PCD3L	PCD3	PCD4H	PCD4L	PCD4	PCD6
Dimensions (height, diameter)	220.73 mm, Ø 34.80 mm	208.28 mm, Ø 34.80 mm	207.56 mm, Ø 34.80 mm	240.2 mm, Ø 35 mm	230.35 mm, Ø 35 mm	230.28 mm, Ø 35 mm	274 mm, Ø 34 mm
Weight (approx.)	451 g (1.0 lb)	556 g (1.2 lb)	380 g (0.8 lb)	689 g (1.52 lb)	671 g (1.48 lb)	420 g (0.9 lb)	753 g (1.66 lb)
Dispensing volume	≈ 0.012 ml/rotation			≈ 0.05 ml/rotation			≈ 0.14 ml/rotation
Theoretical flow rate*	0.12 to 1.48 ml/min			0.2-6.0 ml/min	0.5-6.0 ml/min		1.4-16.0 ml/min
Minimum dispensing amount**	0.0005 ml	0.001 ml		0.004 ml		0.015 ml	
Priming volume	≈ 1.5 cc		≈ 3 cc	≈ 1.5 cc		≈ 3 cc	≈ 4 cc
Dispense precision ml, absolute**	±1%						
Maximum input pressure	6 bar (87 psi)						
Maximum dispensing pressure*	20 bar (290 psi)						
Parts touched by medium	HD-POM, Stainless Steel, Anodized Aluminum						
Motor rotating speed	0-120 rpm						
Operating ambient conditions°C	+10 to +40 non-condensing, air pressure 1 bar (14.5 psi)						
Medium temperature°C	+10 to +40						
Storage conditions°C	Dry and dust free, -10 to +40						
Pump cable length	250 mm (10"), Extension cable available						
Stator material	Inert Elastomer						
Maximum viscosity***	60,000 cps						
Nozzle type	Luer or Precision		Luer	Luer or Precision		Luer	
Thread used - medium input	Standard luer lock or 1/4-32		1/8" cylindrical Whitworth pipe thread	Standard luer lock or 1/4-32		1/8" cylindrical Whitworth pipe thread	1/4" cylindrical Whitworth pipe thread DIN/ISO 228
Material reservoir	Up to 55 cc w/standard mount.		Up to 55 cc w/standard mount. Bulk feed possible.	Up to 55 cc w/standard mount.		Up to 55 cc w/standard mount. Bulk feed possible.	
Air free reservoir exchange	Yes		No	Yes		No	
Drip & drool free	Yes						

* Depending on viscosity & primary pressure of medium. All pressure details are maximum values for low-to-medium viscosity media (20,000 mPas).
 ** Reference medium approx. 1.000 mPas at 20° C.
 *** Higher viscosity may be possible based on nozzle size and flow rate.

Programmable Controller for Standard Integration

Dimensions (HxWxD)..... 100 mm x 240 mm x 260 mm (3.94" x 9.45" x 10.24")
 Weight approx. 1.3 kg (2.9 lbs)
 Power supply voltage input: 120/240 V 50 / 60 Hz, output: 24 V DC
 Consumption / Rating..... 100 VA / 2.7 A
 Communication cables:
 Controller to Pump Up to 3 m (118")
 Robot to Controller User-supplied. 18 gauge recommended.
 External trigger signal (basic)..... 24 V*
 Incoming air pressure 0 to 6 bar (0 to 87 psi)
 Manual pressure regulation 0 to incoming air pressure
 Operating temperatures +10° C to +40° C (50° F to 104° F)
 *See User Manual for greater detail.



Programmable Controller

Control Interface for Direct Control Integration



Control Interface

Dimensions (HxWxD)..... 142 mm x 85 mm x 50 mm (5.59" x 3.35" x 1.97")
 Weight 260 g (9 oz)
 Power supply voltage 24 V DC
 Consumption / Rating..... 100 VA / 2.7 A
 Speed control voltage..... 0.3 Volts to 10 Volts (maximum pump speed is 10V)
 Communication cables:
 Controller to Pump Up to 2.5 m (98")
 Robot to Controller 0.6 m (24") standard. One end is bare wire.
 Operating temperatures +10° C to +40° C



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