

GPD Global[®]

Precision Dispensing Systems

Dispensing Systems & Pumps



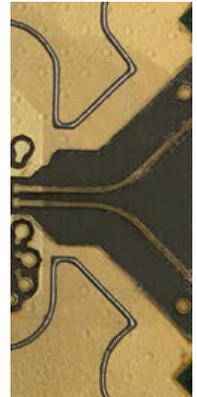
GPD Global[®]
Precision Dispensing Systems

Fully Automated Dispense Systems

MAX

NON-HEATED Dispense Applications Demand This Precision Dispensing System

The MAX is the premier dispensing platforms in the GPD Global® Dispensing line up. These dispense systems are capable of a wide variety of dispense applications including **MicroVolume, Solder Paste and Conductive Adhesive, LED Encapsulation, Surface Mount Adhesive, Encapsulations, and Masks**, to name a few. Accuracy of the MAX is the highest in the industry at ± 0.025 mm (± 0.001 "). MAX systems are available in either stand-alone or inline configurations.



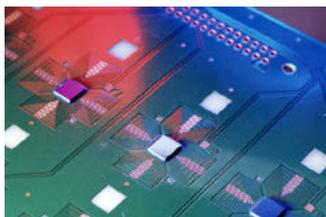
Basic Specifications for MAX & MAX II

SPECIFICATIONS	MAX	MAX II
Work Area (X, Y, height): 2 pump stations 1 pump station	305 mm x 305 mm x 83 mm (12" x 12" x 3.25") 358 mm x 305 mm x 83 mm (14.1" x 12" x 3.25")	
Number of Pumps	1 or 2	
Accuracy	± 0.025 mm (± 0.001 ")	
Configurations	Inline Conveyor System or Stand-alone System	
Standard Features	• Automatic Vision • Automatic Calibration • Nozzle Cleaner	
Heat:		
Max Temperature	Not applicable	150° C maximum
Heated Zones	Not applicable	3 Heated Zones

MAX II

HEATED Dispense Applications Demand This Precision Dispensing System

When heat is required on the substrate or fluid, the MAX II delivers. With an available **3 zones of heat** for inline systems as well as fluid heating, your process will be completely under control. For batch applications, the **work table is heated** and can be customized for your product. In both system configurations, heat is transmitted via heated vacuum fixtures or via forced air. The PCD dispense pump is a perfect match for heated applications as the volume of dispensed fluid will not vary, even when the viscosity changes, and will not drip or drool.



Fully Automated for Large Products

DS Series

For Applications that Demand Large Board Processing and/or Versatility

The DS Series of dispensers is a robust, large format platform designed to handle all types of applications with ease. Ideal for dispense applications utilizing **adhesive, solder paste, conductive adhesive, potting compounds, and more.**

DS Series systems are compatible with all GPD Global® dispense pumps. For the utmost in versatility and capability the DS Series is able to handle **up to 3 different dispense pumps.** The system is able to toggle between each of the pumps in a single program.

The DS Series has a **host of standard features** making it a well-rounded performer.

All systems come with Automatic Vision for product alignment, fully automatic XYZ nozzle calibration, automatic nozzle cleaner, and a contact surface sensor. For sensitive applications, a laser surface sensor is available. The DS Series is versatile enough that the operator can change between a laser and contact surface sensor when applications demand it.

Numerous optional items are available to optimize your dispensing experience.

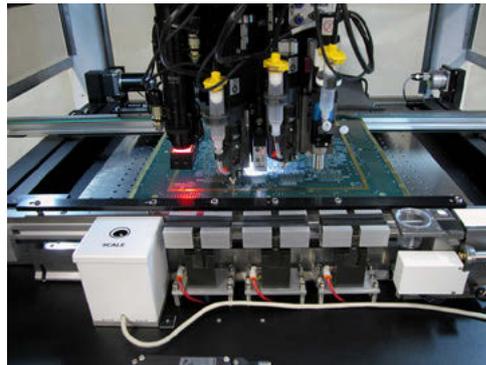
ClearVu™ Vision is a programmable zoom and focus camera that allows your system to align on the smallest of product features. The Process View Camera will magnify the dispense process at the dispense tip in real-time. These speed up process development as well as allowing the operator to keep an eye on product. Contact the factory regarding other available features.

The DS Series is highlighted by its **large work area**, up to 609 mm x 609 mm (24" x 24"), the largest standard platform in the industry. Available in standalone or inline it can be configured to meet your production needs.

Heating for large boards is available in the DS Series. Inline configurations are available with 3 zones of heat. When configured as a stand-alone system, the entire work table may be heated and include vacuum or forced air.



DS Series with Three Dispense Pumps



Basic Specifications for DS Series

Work Area (X, Y)	609 mm x 609 mm (24" x 24")
Number of Pumps	Up to 3 mounted
Accuracy	±0.038 mm (±0.0015")
Configurations	Inline or Stand-alone
Standard Features	<ul style="list-style-type: none">• Automatic Vision• Automatic Calibration• Nozzle Cleaner
Heat:	
Max Temperature	150° C maximum
Heated Zones	Single Heated Zone + optional Pre-Heat & /or Post-Heat modules. Fluid/Pump heat available.

Conformal Coating System

SimpleCoat

Cost-effective Solution for Conformal Coating



SimpleCoat and SimpleCoat TR are ideal for selective conformal coating and dispensing applications requiring a high level of accuracy and repeatability. Both are ideal solutions for production volumes or high mix applications. A stand-alone configuration is available when a conveyor is not required.

Both models are equipped with a robust 3-axis motion platform. The basic configuration includes a spray valve and needle valve.

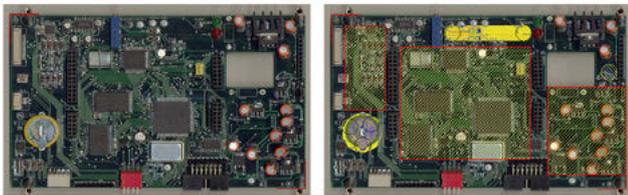
Alternatively, advanced valves are available for higher viscosity coating, tight edge definition, and lowest possible amount of overspray. An optional volumetric pump may be used in place of the needle valve. The SimpleCoat TR model's **Tilt and Rotate valve** in station 1 accesses four sides of a product.

The SimpleCoat software, installed on a user-supplied laptop computer, is easy to program either by manually teaching a program or by using a JPG image of a PCB. All dispense and motion parameters can be easily altered with the easy-to-use interface. Standard patterns for coating of line, dot, and various area fill shapes are available.

Tilt-and-Rotate Valve



Programming via JPG image (before and after).



Fluid is supplied to the dispense valves via external reservoirs. Level detects and large reservoirs are also available. The stainless steel work area surfaces are easily cleaned. An exhaust port, located below the work surface, removes harmful fumes. A flow sensor in the exhaust port inhibits operation if exhaust flow drops below a set level.

Standard Features

- Reliable XYZ motion system
- Full-featured Programming including Teach from JPG
- Inline Operation with SMEMA Communication
- Spray and Needle Valves
- Purge and Solvent Cups
- Internal Black Light for Coating Inspection
- Keyed Maintenance Mode
- and more

Basic Specifications for SimpleCoat

SPECIFICATION	SIMPLECOAT	SIMPLECOAT TR
Footprint (W x D x H)	1.00 m x 1.40 m x 1.55 m (39.37" x 55.12" x 61.02")	
Dispense Valves	Up to 2 valves	
XYZ Axis Drive	Stepper motors plus ball screw	
XYZ Repeatability	50 µm (0.002")	
Speed	350 mm (13.78") per second	
XYZ Travel	394 mm x 394 mm x 50 mm (15.5" x 15.5" x 2") <i>Basic model with 2 valves</i>	457 mm x 394 mm x 50 mm (18" x 15.5" x 2") <i>Tilt and Rotate model with Spray Valve only & without tilt and rotate</i>
Bottom Side Clearance	100 mm (4")	
Conveyor Type	Pin Chain	
Transport Height	940 mm – 965 mm (37" - 38")	
Communication	SMEMA	
Standard Features	• Spray & Needle Valve • XYZ motion system	• Exhaust flow sensor • External fluid reservoirs

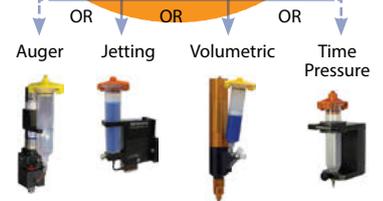
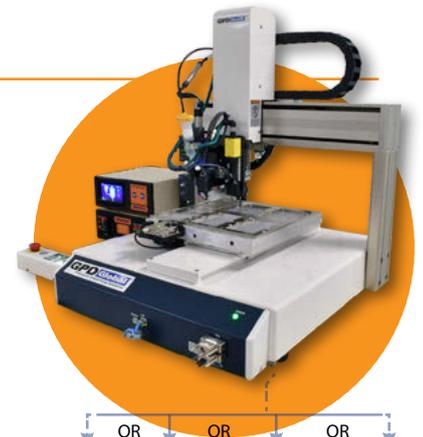
Basic Specifications for Valves

SPECIFICATION	SPRAY VALVE SPV100	NEEDLE VALVE NDV250
Viscosity range	1-20,000 cps	1-500,000 cps
Weight	525 g (1.2 lbs)	490-650 g (1.1-1.4 lbs)
Material pressure - max.	35 bar (508 psi)	
Control air pressure - min.	5-6 bar (73-87 psi)	5-8 bar (73-116 psi)
Spray air pressure	At least 0.5 bar (7 psi) less than the control air pressure	n/a
Operating temperature - max.	80° C (176° F)	
Voltage	24 VDC	n/a

Benchtop Dispensing

Catalina Series

Table Top Dispense System



The compact, full-featured, Table Top Dispense System (Catalina Series) gives you the versatility to do both simple and complex jobs. The Catalina is a full-featured platform with **many standard features** including automatic vision, automatic nozzle calibration, and laser non-contact surface sensing. A **tilt and rotate model** is available to meet your production needs. The Catalina benchtop series can be configured with an **optional heated work area**.

Catalina provides accurate and repeatable dispense results. Applications using **solder pastes, glues, encapsulations, gasketing, underfills, conductive adhesives, and more benefit** from Catalina tabletop dispensing system.

Easy Programming

Programming is done via computer. User-friendly graphic editing allows users to effortlessly create a dispense path.

For complex path programming, AutoCAD DXF files can be imported.

For uneven surfaces the system may use the laser to trace a dispense path for automatic dispense height adjustment.

Standard Features

- Easy to learn, computer-based software/ Windows operating system
- Easy point-based teaching for all axis movement. Set point jobs and various parameters.
- Automatic Alignment & positioning with high resolution camera
- Create dispense paths using camera teach or on-screen graphic editing
- Import DXF files for complex programming
- I/O ports provides the flexibility to add advanced features/equipment

Add-on Options

- Real Time Process Control (FPC) for pumps.
- Heated work area up to 120° C (248 F°).
- Fluid Level Detect
- Contact Surface Sensor
- Laptop computer or Teaching Pendant

Basic Specifications for Catalina Series			
SPECIFICATION	CATALINA	CATALINA TR	CATALINA MINI
Dispense Pump Capacity	Single		
Height Sensing	Contact or non-Contact (Laser)	Non-Contact (Laser)	—
Work Area	X, Y, Z Axes	400 x 400 x 150 mm	
	R-Axis (rotation)	—	±360°
Speed, maximum Point to Point	X & Y Axes	800 mm/sec (31.5"/sec)	700 mm/sec (27.56"/sec)
	Z Axis	400 mm/sec (15.75"/sec)	
	R-Axis (rotation)	—	900°/sec
Speed, maximum Continuous Path	X, Y, Z combined	850 mm/sec (33.46"/sec)	600 mm/sec (23.62"/sec)
Resolution	X, Y, Z Axes	0.001 mm	
	R-Axis (rotation)	—	±0.01°
Repeatability	X & Y Axes	±0.007 mm	±0.01 mm
	Z Axis	±0.007 mm	±0.01 mm
	R-Axis (rotation)	—	0.008°
Interpolation Function	3D linear and arc		
Data Storage	On-board and backed up via PC Software when connected and downloaded		
Footprint (W x D x H) (excludes protrusions)	651 x 668 x 715 mm (25.6" x 26.3" x 28.1")	651 x 668 x 844 mm (25.6" x 26.3" x 33.2")	323 x 387 x 554 mm (12.7" x 15.2" x 21.4")
Drive System	5 phase pulse/stepping motor		
Programming Method and Teaching	Easy point-based teaching for all axis movement. Able to set point jobs and various parameters. Remote Teaching (JOG) / Manual Data Input (MDI) PC Teach / Graphic Edit		
Automatic Vision	Standard		—

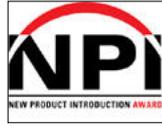


Award-Winning Fluid Dispense Pump

PCD Pump

It's Not an Auger –
It's Continuously Volumetric Dispensing

PCD Technology revolutionizes how you dispense and how you perceive dispensing. Proprietary progressive cavity dispense technology for continuously volumetric dispensing. Outstanding capabilities for **low-to-mid/high viscosity fluids**. No drip or drool and repeatable results over the entire pot life of the fluid.



No Drip or Drool

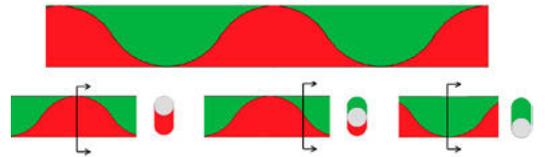
even with Water Under Pressure,
plus a Wide Viscosity Range



Progressive Cavity

The primary components of a PCD are a single helix rotor and a dual helix stator. The rotor rotates inside the stator and generates cavities of fluid that are 180 degrees out of phase. As the rotor rotates, the cavities of fluid are moved through the stator. The results is volumetric dispensing with the dispense determined by how much the rotor is rotated.

At any point in rotation of the rotor,
the slice of fluid has a constant dimension.

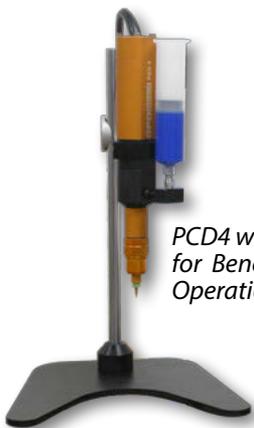


Volumetric Pump for Integration

The PCD4 volumetric pump may be used in a stand-alone, laboratory environment or integrated into other systems through a **fully programmable controller**. The controller allows the pump to be programmed in 1 of 3 modes: Volumetric, Time, or Start/Stop.

PCD Integration Kit

Your robot



PCD4 with Stand
for Bench or Manual
Operations

Basic Specifications: PCD3L, PCD4L, PCD6, PCD7

SPECIFICATION	PCD3L	PCD4L	PCD6	PCD7
Theoretical flow rate	0.12-1.48 ml/min*	0.5-6.0 ml/min*	1.4-16.0 ml/min*	5.3-60.0 ml/min*
Minimum dispensing amount	0.001 ml	0.004 ml**	0.015 ml	0.06 ml
Priming volume	≈ 1.5 cc		≈ 4 cc	≈ 4 cc
Wetted Materials	HD-POM, Stainless Steel, Anodized Aluminum			

*Volume flow dependent on viscosity and primary pressure.
**Reference medium approximately 1.000 mPas at 20° C.

Jetting Simplified

NCM5000 Jetting Pump

Compatible with Wide Range of Fluids

Jetting pumps are excellent for dispensing small volumes of fluid at high rates of speed. The NCM5000 simplifies jetting to its basic elements - this means **easy set up, cleaning, and maintenance**. The pneumatic drive system is designed for reliable operation at high speeds. The NCM5000 Jetting Pump **dispenses as small as 2 nl**.

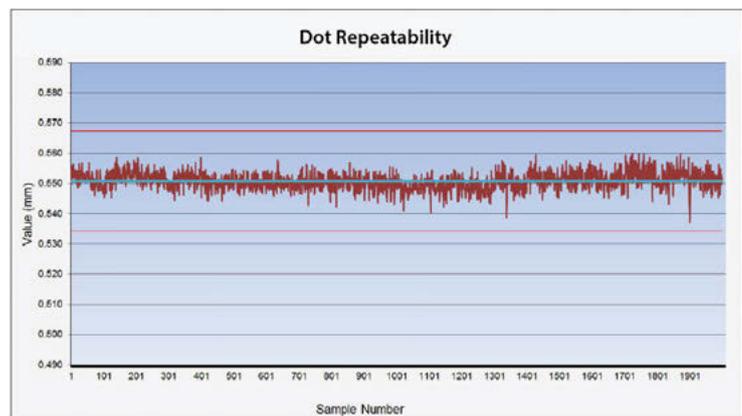


Dispense Range

The NCM5000 is compatible with a wide range of fluids: **UV curables, SMT Glue, Underfills and LED encapsulants** to name a few. Nozzles are available in sizes ranging from 75 μm to 200 μm with either flat or capillary configurations for cavity dispensing. Nozzles are made from ceramic or carbide.

Nozzle Selection

DESCRIPTION	PART No.
Carbide Nozzle Plate, 75 μm	2650-0227
Carbide Nozzle Plate, 100 μm	2650-0153
Carbide Nozzle Plate, 125 μm	2650-0132
Carbide Nozzle Plate, 150 μm	2650-0133
Carbide Nozzle Plate, 200 μm	2650-0134
Ceramic Nozzle Plate, 75 μm	2650-0135
Ceramic Nozzle Plate, 125 μm	2650-0136
Ceramic Nozzle Plate, 200 μm	2650-0137
Ceramic Capillary Nozzle Plate, 75 μm	2650-0249
Ceramic Capillary Nozzle Plate, 125 μm	2650-0251
Ceramic Capillary Nozzle Plate, 200 μm	2650-0253



Upgrade Your System to Jetting

When not used on a GPD Global platform, an **offline controller** is available. The pump can be cycled by an operator with a press of a button or via input from a robot or external control system. Up to 6 different program sets are available and can be selected remotely via external input.



The controller kit includes the controller and cables for operation. Plug and go!

Easy Setup & Cleaning

The NCM5000 is easy to maintain. A complete pump consists of 3 primary parts: the main body and two wetted parts - a diaphragm and nozzle plate. The wetted parts are easily removed and cleaned by hand or in an ultrasonic cleaner.



Small Volume & High Viscosity Pumps

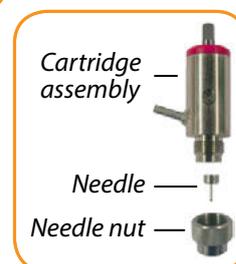
Precision Auger

Performance of Three Auger Pumps in One

GPD Global Precision Auger is encoder controlled and designed to accommodate a **wide variety of pastes and mid-to-high viscosity fluids**. The auger and cartridge assembly are precisely machined from carbide for long life and wear resistance.

The pump changes its dispense capabilities with the simple change of the auger/cartridge assembly. Auger/cartridge assemblies are available in ultra small, standard, and high volume configurations.

- When configured with the smallest auger (062), the pump can **dispense solder paste down to 0.005" (125 µm)**. This newest auger reaches a new limit of dispensing not previously possible.
- Standard quantity dispensing is reserved for the 105 auger which easily achieves diameters of 0.010" (254 µm). Various auger depths are available for process tweaking.
- The highest level of flow rate is achieved with the 186 auger. Use this auger for glob top, encapsulation, or thermal interface applications.



Dispense Nozzles

Precision Auger Pumps use precision nozzles. **Precision nozzles offer excellent liquid control for both small and large application quantities.** Precision nozzles are designed with a large area material feedway leading to a final output diameter. This design feature reduces internal pressure and enhances fluid control. Nozzles are made from carbide or ceramic and are available with output diameters down to 0.002" (50 µm). Alternatively, Precision Auger Pumps are compatible with luer needles with an adapter.

Precision Nozzles 062 & 105 Auger Stainless Steel		
INTERNAL DIA.	GAUGE	PART No.
0.1016 mm / 0.004"	32 G	221BL32018A
0.127 mm / 0.005"	31 G	221BL31001A
0.15 mm / 0.006"	30 G	221BL30001A
0.18 mm / 0.007"	28 G	221BL28004A
0.21 mm / 0.008"	27 G	221BL27005A
0.25 mm / 0.010"	25 G	221BL25007A
0.33 mm / 0.013"	23 G	221BL23006A
0.41 mm / 0.016"	22 G	221BL22005A
0.51 mm / 0.020"	21 G	221BL21006A
0.5969 mm / 0.0235"	20 G	221BL20003A
0.84 mm / 0.033"	18 G	221BL18007A

Precision Nozzles 186 Auger Stainless Steel		
INTERNAL DIA.	GAUGE	PART No.
0.18 mm / 0.007"	28 G	221BL28E03A
0.20 mm / 0.008"	27 G	221BL27E03A
0.25 mm / 0.010"	25 G	221BL25E04A
0.33 mm / 0.013"	23 G	221BL23E04A
0.41 mm / 0.016"	22 G	221BL22E04A
0.51 mm / 0.020"	21 G	221BL21E05A
0.58 mm / 0.023"	20 G	221BL20E03A
0.72 mm / 0.028"	19 G	221BL19E03A
0.84 mm / 0.033"	18 G	221BL18E04A
1.07 mm / 0.042"	17 G	221BL17E01A
1.19 mm / 0.047"	16 G	221BL16E01A
1.37 mm / 0.054"	15 G	221BL15E01A
1.60 mm / 0.063"	14 G	221BL14E01A
1.80 mm / 0.071"	13 G	221BL13E01A
2.16 mm / 0.085"	12 G	221BL12E01A
2.39 mm / 0.094"	11 G	221BL11E01A

Contact GPD Global for more information regarding other needle configurations and materials.

Offline Pump Control

Precision Auger Pump performance can be integrated into your existing system with the offline controller. The offline controller allows programming of all aspects of dispensing process, including acceleration, deceleration, speed, and dot size.

Easily interface with the controller using an external signal. Multiple recipes may be selected via external input. Remote programming is also possible when the controller is connected to a computer.

Pump Controller



Real Time Process Control

Real Time Process Control with FPC

Why Settle for Less than Optimal Performance?

Patented

No other method makes adjustments to the dispense process in real-time while a process is running. Optimize and take advantage of the fine mechanics and control systems designed into the dispense pump.

Real Time Process Control (FPC) for the dispense pump enhances the repeatability of a pump during the production process. Working in conjunction with other pump calibration methods, **FPC monitors and adjusts the dispense process in real time, resulting in optimal pump performance.**

FPC automatically Monitors & Adjusts fluid fed into pump

- Avoid starving and over pressurizing the pump reservoir.
- With a consistent supply of fluid, pump achieves higher levels of repeatability over a longer period of time.



Compatibility and Integration

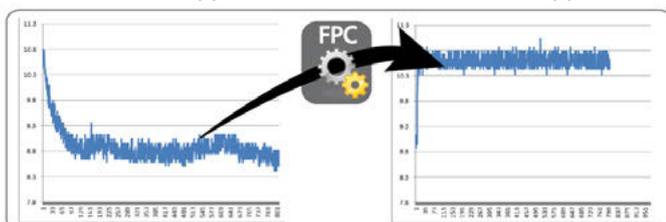
- FPC hardware is compatible with dispense technologies such as Auger, Jetting, and Time Pressure.
- Requires no programming or changes to the dispense routine.
- To reduce rework and rejected product:
 - 1 - Interface the controller with a simple input from your system.
 - 2 - Supply electricity and air.
 - 3 - Set the desired feed pressure.

Integrate FPC for Uniform Dispense Results

Dispensed Weight Testing

Without FPC Applied

With FPC Applied



Results of Real Time Process Control

- In real time, the patented FPC system monitors the pressure of fluid entering a pump.
- FPC makes instantaneous adjustments to maintain constant feed pressure into the pump resulting in **uniform dispense results without the need for operator interaction.**



Optimize Both: Flow & Control

Time-Pressure Dispensing

Simple & Versatile Function across wide viscosity range

- Dispense lines, fills, and dots
- Great for short pot-life material
- Good choice for hand-held operations
- Suitable for wide range of fluid viscosities
- All wetted parts are disposable
- No cleaning required



Works by applying pressure to the syringe. Simply attach the supplied syringe air cap and Luer dispense tip.

Simple & Versatile Dispensing

Operator uses pulsed air to dispense volumes of fluid via two modes of operation:

- Pulsed Mode - operator activates footswitch or start button. Controller remains on for a programmed period of time.
- Start/Stop Mode - system continues to apply air to the reservoir until the operator removes the input signal.

Simple & Versatile



Advanced & Versatile Dispensing

Advanced Time Pressure FPC further enhances dispensing results:

- Consistent fluid flow to ensure accurate dispense result.
- User determines the dispense pressure set points and can program process pauses.
- Programmable Controller accommodates up to 30 programs.

For more FPC advantages, refer to Real Time Process Control page.

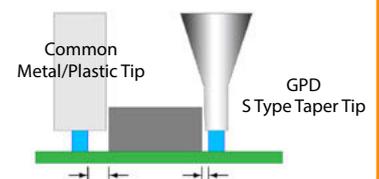
S Type Taper Nozzles

Unique Design = Numerous Benefits

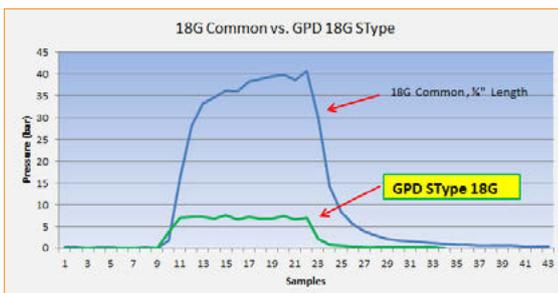
S type taper nozzles improve your existing dispense results. The unique conical design **reduces back pressure** through the material path. It also **eliminates clogging** due to high pressure build-up through a long tube.



Dramatic difference in DISTANCE between needle tip & component



Dramatic PRESSURE differential between common metal/plastic-housing nozzles & GPD S Type Taper Tips



Benefits of S Type Taper Tips

- Use with any Luer nozzle system for immediate improvement
- Improved flow over commonly available Luer nozzles
- Better repeatability
- Less material wicking to nozzle side
- Smallest O.D. for given I.D.
- More rigid for given I.D.
- Can be cleaned for re-use
- Special coatings to meet process requirements

Programming Made Easy

UltiPath - Maximize Gantry Efficiency

Programming multi-pass operations has never been easier

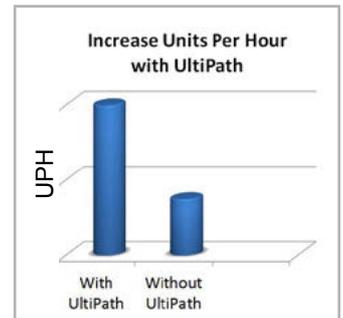
UltiPath dispense optimization, a standard feature of GPD's FLOWare® software since 2009, **increases throughput via continuous gantry motion** and **reduces programming time for multi-pass applications** such as underfill.

When products consist of multiple component sizes and the number of operations varies for each, it can get very complicated to maximize gantry effectiveness. Rather than trying to "best guess" an optimal path or component order, operators use UltiPath features to program each component including number of passes and delay between passes.

When an operator constructs the program, they need only insert a single dispense routine for each component at the correct X,Y location. When the program runs, **UltiPath automatically selects the best route for the gantry.**

After the first dispense pass, UltiPath monitors its internal timers and determines which component is ready for its next operation. By selecting the next dispense operation based on a constantly monitored time sequence, UltiPath maximizes gantry effectiveness.

Additionally, if a device requires additional operations or if delays need to be modified, the operator need only adjust the specific component and UltiPath adjusts accordingly – no need to sift through an elaborate program and manually shift points.



Data Translator

Quick & Accurate Conversion

The import files for our dispense platforms are designed to be as flexible as possible. This allows you to **easily create dispensing data from pick-and-place or other mechanical data. It also enables you to create programs manually.**

The criteria is minimal for dispensing program data created offline in a GPD-defined "generic" format:

- generalized comma-delimited form,
- contain only data significant to the operation, and
- allow all other data to default.

Data defaults don't need to be included with the data; they can be supplied after the data is imported. After a trial run, the dispensing program can be tuned to perfection. Contact the GPD Global Service Department for additional information.

Networking

Interface Protocols

SECS/GEM (SEMI Equipment Communications Standard)/(Generic Equipment Model) is a set of interface protocols used with equipment-to-host data communications.

These standards provide a standard definition for equipment to follow when communicating with host data-collection systems. **In an automated production environment, the SECS/GEM interface can start and stop equipment processing, collect data, change process parameters, and select recipes** for different products based on bar-code driven data.

Summary

Machines

Machine Overview					
	MAX	MAX II	DS SERIES	CATALINA SERIES	SIMPLECOAT
Work Area (XYZ)	358 x 305 x 83 mm (14.1" x 12.0" x 3.25")	358 x 305 x 83 mm (14.1" x 12.0" x 3.25")	609 x 609 x 95 mm (24" x 24" x 3.75")	See details on Catalina Series product page	432 x 432 x 51 mm (17" x 17" x 2")
Drive System	Servo	Servo	Servo	Stepping Motor	Stepper Motor plus Ball Screw
Accuracy	±0.0254 mm (±0.001")	±0.0254 mm (±0.001")	±0.038 mm (±0.0015")	—	±0.05 mm (±0.002")
Acceleration	0.7 g	0.7 g	0.5 g	0.6 g - 0.9 g	0.5 g
Linear Speed	686 mm/sec (27"/sec)	686 mm/sec (27"/sec)	508 mm/sec (20"/sec)	See details by model on Catalina Series product page	350 mm/sec (13.78"/sec)
Footprint (XY)	94 cm x 119 cm (36.9" x 47")	135 cm x 119 cm (53" x 47")	185 cm x 166 cm (73" x 65.5")		100 cm x 140 cm (39.37" x 55.12")
Pump Capacity*	Up to 2	Up to 2	Up to 3	1	Up to 2
Vision System	Automatic	Automatic	Automatic	Automatic	N/A

* Tandem pumps are optional for all machines

Pumps

Pump Overview									
Pump Type	VOLUMETRIC				PRECISION AUGER			JETTING	TIME PRESSURE
Model	PCD3	PCD4	PCD6	PCD7	062	105	186	NCM5000	TIME PRESSURE/FPC
Viscosity Range	1 < 60,000 cps				8,000 - 500 K+ cps			1-400K cps	1-500K+ cps
Dispense Technology	Progressive cavity				Auger			Jet	Pressure
Controls Type	Encoded Motor				Encoded Motor			Pneumatic	Pneumatic
Wetted Materials	HD-POM, Stainless Steel, Anodized Aluminum				Carbide, Stainless Steel			Carbide, or Ceramic EPDM, Viton, or Silicon	Syringe, Nozzle
Smallest Shot Size	1 µL	4 µL	15 µL	60 µL	0.5 nL	3.4 nL	65 nL	2 nL	Varies (call us)
Maximum Flow Rate	1.3 ml/min	6 ml/min	18 ml/min	60 ml/min	N/A			N/A	N/A
Nozzle Type	Luer				Precision or Luer			Flat or Capillary	Luer

S Type Taper Nozzles

GPD S Type Taper Nozzles						
I.D.	O.D.	GAUGE	METAL	COLOR	PART No.	
1.041 mm / 0.041"	1.245 mm / 0.049"	17 G	PB with EN*	Pink	10/4784	
0.864 mm / 0.034"	1.067 mm / 0.042"	18 G		Tan	10/4785	
0.686 mm / 0.027"	0.889 mm / 0.035"	19 G		Green	10/4786	
0.609 mm / 0.024"	0.813 mm / 0.032"	20 G		Light Blue	10/4787	
0.564 mm / 0.022"	0.635 mm / 0.025"	21 G		Purple	10/4788	
0.437 mm / 0.017"	0.508 mm / 0.020"	22 G		White	10/4789	
0.335 mm / 0.013"	0.406 mm / 0.016"	23 G		Red	10/4790	
0.233 mm / 0.009"	0.305 mm / 0.012"	25 G		Black	10/4791	
Standard Nozzle Sample Kit		17-25 G			see above	10/4783
0.152 mm / 0.006"	0.254 mm / 0.010"	30 G		NS with EN†	Dark Blue	10/4792
0.102 mm / 0.004"	0.200 mm / 0.008"	32 G		Orange	10/4793	
0.051 mm / 0.002"	0.150 mm / 0.006"	---	NS‡	Yellow	10/4794	
µm Nozzle Sample Kit with .002, .004, .006 I.D.			see above	see above	22110499	

KEY:
 * PB with EN = Phosphor Bronze with Electroless Nickel
 † NS = Nickel Silver with no plating
 ‡ NS with EN = Nickel Silver with Electroless Nickel

Contact GPD Global regarding other standard metals.

O.D. Comparison		
GAUGE	MEDICAL TUBING O.D.	GPD S TYPE O.D.
17 G	1.473 mm / 0.058"	1.245 mm / 0.049"
18 G	1.270 mm / 0.050"	1.067 mm / 0.042"
19 G	1.067 mm / 0.042"	0.889 mm / 0.035"
20 G	0.909 mm / 0.036"	0.813 mm / 0.032"
21 G	0.812 mm / 0.032"	0.635 mm / 0.025"
22 G	0.711 mm / 0.028"	0.508 mm / 0.020"
23 G	0.642 mm / 0.025"	0.406 mm / 0.016"
25 G	0.516 mm / 0.020"	0.305 mm / 0.012"

Visit the GPD Global web site to locate a sales representative in your area



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* Specifications are subject to change without notice
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