

Dispensing Systems & Pumps



Next Generation Advanced Dispenser

UltraMAX™

Accuracy & High Speed Solder Paste Jetting



The UltraMAX™ is a next-generation high-speed solder paste jetting dispenser engineered to deliver exceptional performance across a wide range of advanced fluid dispensing applications, including:

- Solder Paste
- Conductive Adhesive
- SMT Adhesive
- LED Encapsulation
- Potting Compounds
- and more...

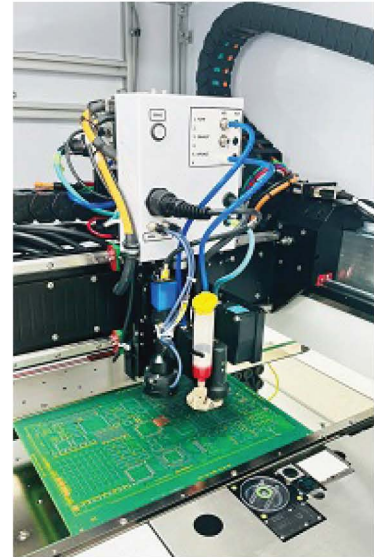
Unmatched Stability and Accuracy

At the core of the UltraMAX™ system is a robust, molded unibody frame that ensures extraordinary mechanical stability and consistent jetting precision. Designed for demanding electronics manufacturing environments, UltraMAX™ combines innovation and durability to deliver unmatched dispensing accuracy - even at maximum throughput.

Basic Specifications For UltraMAX™	
Work Area	355 mm × 355 mm (14" × 14")
Heat	Non-heated System
Accuracy*	±0.012 mm (±.0005")
Repeatability (per axis)	±0.008 mm (±.0003")
Pump Speed*	Up to 1,080,000 dots/hr with jet pump (37,500 components/hr)
Encoder	1 µm, Linear
Gantry Type	X & Y - Linear, Z - Rotary
Gantry Linear Speed	1.5 m/sec (59"/sec)
Gantry Acceleration	2 g or 20 m/s ²
Field of View (camera X,Y)	11 mm x 8 mm
*With system mapping over standard work area	

UltraMAX™ - Specifications

UltraMAX™ Gantry



Board Handling & Transport	
Board thickness	0.5 - 12.5 mm (0.02 in - 0.5 in)
Overboard clearance	25 mm (1 in)
Underboard clearance	25 mm (1 in)
Board edge clearance - top	0 - 5 mm (0.0 in - 0.2 in)
Board edge clearance - bottom	5 mm (0.2 in)
Board transport height (SMEMA)	930 - 975 mm (36.6 in - 38.4 in)
Direction of transport	Left to right, right to left
Maximum board/product weight	10 kg

Air & Ventilation	
Pressure, clean dry air	552 kPa (80 psi)
Flow rate(max)* = sum of flow for each system present	<ul style="list-style-type: none"> Machine 113 l/min @ 600 kPa (4CFM @ 87 psi) Vacuum 113 l/min @ 600 kPa (4CFM @ 87 psi)
Exhaust port diameter (per port)	101.6 mm (4 in)
Flow rate per port	7.079 l/min (250 CFM)
Air fitting thread	¼ in NPT
* Customer supplies connecting hardware	
* Customer supplies ducting to exhaust port	

Power	
Voltage	208-240 VAC, single phase
Frequency	50/60 Hz
Amperage (max)	30 amps @ 230 volts

Software
Powered by Windows 11
DXF and Gerber file import
Pre-configured component library
Real-time on-screen process visualization
Bad board exclusion using fiducials and bad marks
Automatic conveyor width adjustment
Built-in optimization & cycle time management tools
SECS/GEM communication compatibility
Intuitive recipe creation with user-friendly programming

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:

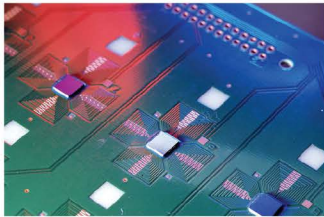
- MicroVolume
- Solder Paste
- Conductive Adhesive
- LED Encapsulation
- Surface Mount Adhesive
- Encapsulations and Masks
- and more...

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	
Work Area (X, Y, height): 2 pump station 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: Maximum Temperature Heated Zones	Not applicable Not applicable

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. Common applications include:

- Underfill
- Dam and Fill
- Glob top
- and more...



Basic Specifications For MAX II	
Work Area (X, Y, height): 2 pump station 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: Maximum Temperature Heated Zones	150° C maximum 3 Heated Zones

Fully Automated for Large Products

DS Series

For Applications that Demand Large Board Processing and/or Versatility



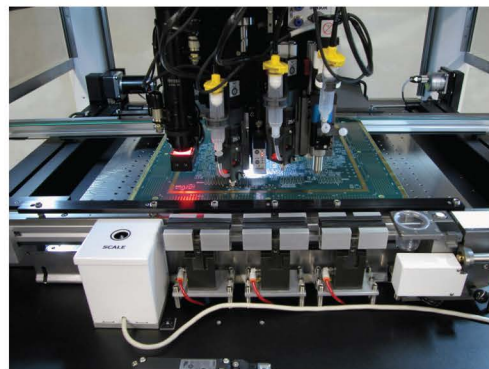
The DS Series of dispensers is a robust, large format platform designed to handle all types of applications with ease. Ideal for dispense applications utilizing adhesive, solder paste, conductive adhesive, potting compounds, and more.

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.

Standard Features

- Automatic Vision for product alignment
- Fully automatic XYZ nozzle calibration
- Automatic nozzle cleaner
- Contact surface sensor included
- Optional laser surface sensor for sensitive applications
- Easy switching between laser and contact sensors for different applications

Each DS Series platform can handle up to three different pumps or tools. The large work area in these systems can handle most processes.



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.

Add-On Options

- **Real Time Process Control (FPC)** - Maximizes pump performance through real-time pressure monitoring and adjustment, maintaining consistent fluid feed from full to empty reservoirs for accurate dots, lines, and area fills.
- **Process View Camera** - Displays dispense process at dispense tip on a separate monitor. Camera can look at all three tips.
- **Process Calibration Weight Scale** - Calibrates a pump to a programmed flow rate.
- **Additional Needle Cleaners** - To avoid nozzle contamination for multi-materials / liquid processes.
- **Tandem Operation** - Increases throughput for consistently spaced products using two synchronized pumps with adjustable pitch and offset. Both pumps dispense simultaneously, while a single pump can be enabled for odd-numbered product arrays.



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: Maximum Temperature Heated Zones	150° C maximum Single Heated Zone + optional Pre-Heat & /or Post-Heat modules. Fluid/Pump heat available

Programming Made Easy

UltiPath - Maximize Gantry Efficiency

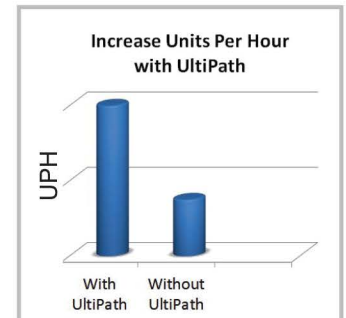
Programming multi-pass operations has never been easier

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 include multiple component sizes and varying process requirements, optimizing gantry efficiency becomes complex. UltiPath removes this complexity by allowing operators to define each component's passes and delay timing individually.

Operators only need to assign a single dispense routine per component at the correct X,Y location. During runtime, **UltiPath automatically selects the best route for the gantry.** and selects the next ready operation after each pass to maintain maximum efficiency.

Additionally, if operations or delays need adjustment, the operator simply updates the specific component and UltiPath automatically adapts- eliminating manual point shifting.



Data Translator

Quick & Accurate Conversion

The import files for our dispensing platforms are highly flexible, allowing for easy creation of dispensing data from pick-and-place or other mechanical data, as well as from manually created programs.

Dispensing programs can be developed offline using component centroid data in a structured, comma-delimited file format. The format is scalable, ranging from basic coordinate and rotation data to a comprehensive recipe that includes pump and process parameters.

The library structure in FLOWare™ software further enhances data import functionality by ensuring that critical process and pump parameters are predefined and referenced within the import file. For additional information, please contact the GPD Global Service Department.

Networking

Interface Protocols

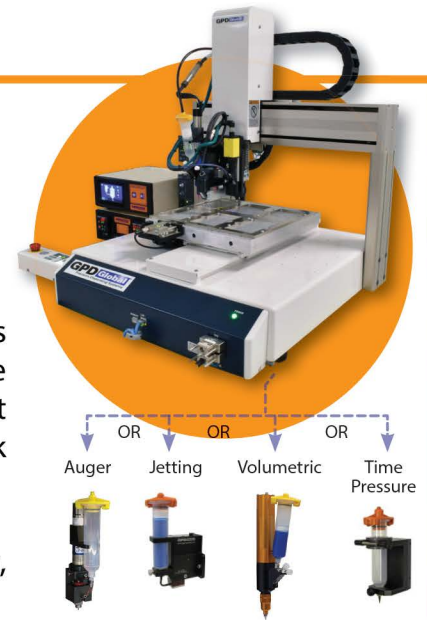
SECS/GEM (SEMI Equipment Communications Standard)/(Generic Equipment Model) is a set of interface protocols used with equipment-to-host data communications.

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.

Benchtop Dispensing

Catalina Series

Table Top Dispense System



The compact, full-featured Catalina Table Top Dispense System handles both simple and complex applications. Standard features include automatic vision, automatic nozzle calibration, and laser non-contact surface sensing. Tilt and rotate models, along with an optional heated work area, are available to meet production requirements.

Catalina provides accurate, repeatable dispensing for solder pastes, glues, encapsulants, gasketing, underfills, conductive adhesives, and more.

Easy Programming

Programming is completed via computer using user-friendly graphic editing to quickly create dispense paths. For complex path programming, AutoCAD DXF files can be imported, and a laser can trace uneven surfaces for automatic dispense height adjustment.

Standard Features

User-friendly Windows® software features simple point-based teaching, automatic camera alignment and positioning, on-screen dispense path editing, DXF import for complex programming, and flexible I/O connectivity for advanced equipment integration.

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		200 x 200 x 50 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)		250 mm/sec (9.84"/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	±0.006 mm
	Z Axis	±0.007 mm	±0.01 mm	±0.006 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		-

Catalina TR model has Tilt-and-Rotate feature



Award-Winning Fluid Dispense Pump

PCD Pump

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

PCD Technology revolutionizes fluid dispensing with proprietary progressive cavity technology for continuous volumetric control. Ideal for **low-to-mid/high viscosity fluids**, it delivers repeatable results with no drip or drool throughout the fluid's entire pot life.



No Drip or Drool

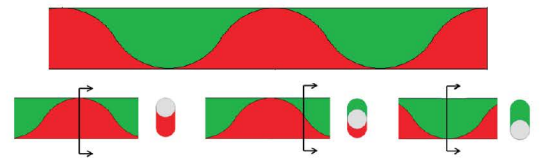
even with Water Under Pressure,
plus a Wide Viscosity Range



Progressive Cavity

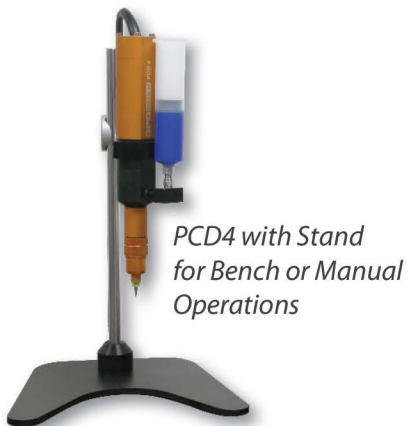
The primary components of a PCD are a single helix rotor and double helix stator. The rotor rotates inside the stator, creating fluid cavities that are 180 degrees out of phase. As the rotor turns, the cavities move through the stator, producing volumetric dispensing based on rotor rotation.

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



Volumetric Pump for Integration

The PCD volumetric pumps 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.



Basic Specifications: PCD3L, PCD4L, PCD6, PCD7				
	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

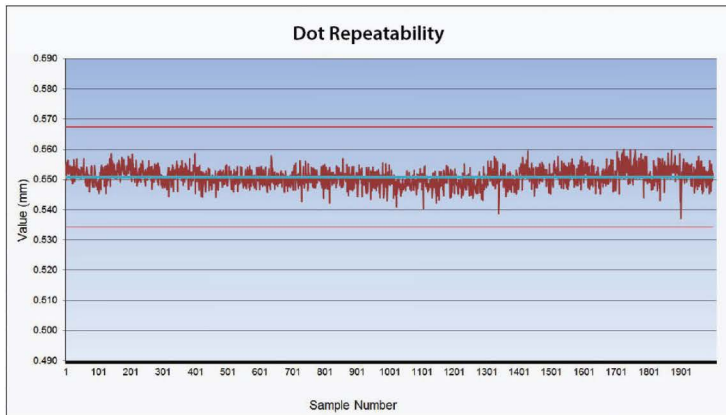
Compatible with Wide Range of Fluids

Jetting pumps are excellent for dispensing small volumes of fluid at high rates of speed. The NCM5000 Jetting Pump delivers high-speed, small-volume dispensing down to 2 nl with simple setup, easy cleaning, and reliable pneumatic operation.

The NCM5000 **dispenses a wide range of fluids**, including UV curables, SMT glue, underfills, and LED encapsulants. It supports 75–200 µm nozzles in flat or capillary styles, available in ceramic or carbide.



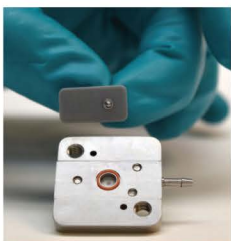
Nozzle Selection



Description	Part No.
Nozzle Plate Carbide Flat 75 µm	2650-0603
Nozzle Plate Carbide Flat 125 µm	2650-0599
Nozzle Plate Carbide Flat 200 µm	2650-0597
Nozzle Plate Ceramic Flat 75 µm	2650-0622
Nozzle Plate Ceramic Flat 125 µm	2650-0623
Nozzle Plate Ceramic Flat 200 µm	2650-0624
Nozzle Plate Carbide Capillary 6mm 75 µm	2650-0640
Nozzle Plate Carbide Capillary 6mm 125 µm	2650-0600
Nozzle Plate Carbide Capillary 6mm 200 µm	2650-0621

Upgrade Your System to Jetting

An offline controller is available for non-GPD Global platforms. The pump can be operated manually, through a robot, or by an external control system, with up to 6 remotely selectable program sets. The controller kit includes the controller and cables for operation. Plug and go!



Easy Setup & Cleaning

The NCM5000 is easy to maintain, with just three main components: the main body, diaphragm, and nozzle plate. Wetted parts are easily removed and cleaned by hand or with an ultrasonic cleaner.

Small Volume & High Viscosity Pumps

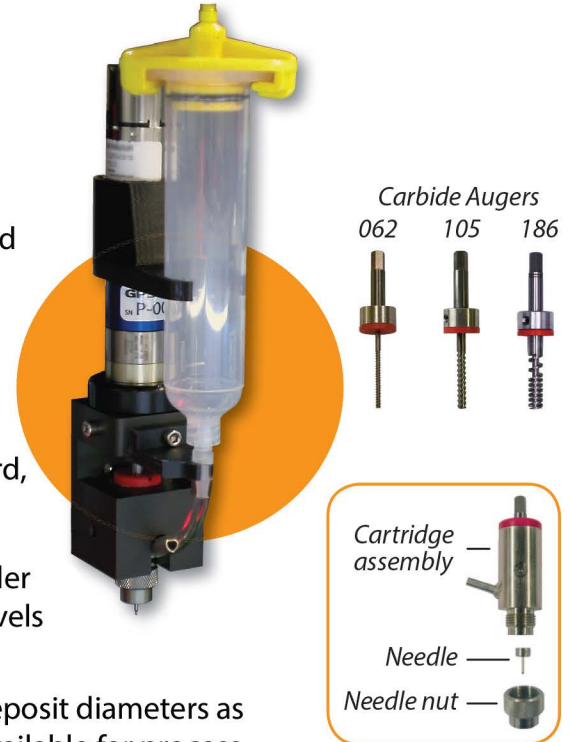
Precision Auger

Performance of Three Auger Pumps in One

The GPD Global Precision Auger Pump is encoder-controlled for accurate dispensing of pastes and mid-to-high viscosity fluids. Its carbide-machined auger and cartridge assembly provide long life and wear resistance.

Dispense capabilities change easily with interchangeable auger/cartridge assemblies, available in ultra-small, standard, and high-volume configurations.

- With the smallest 062 auger, the pump dispenses solder paste down to 0.005" (125 µm) - reaching precision levels previously not possible.
- Standard dispensing uses the 105 auger, achieving deposit diameters as small as 0.010" (254 µm). Multiple auger depths are available for process optimization.
- The highest level of flow rate is achieved with the 105 auger. Use this auger for glob top, encapsulation, or thermal interface applications.



Dispense Nozzles

Precision Auger Pumps use precision nozzles to deliver **highly controlled fluid dispensing for both small and large volumes**. A large feedway reduces internal pressure and improves flow control. Nozzles are made from carbide or ceramic and are available down to 0.002" (50 µm). They can also be used with luer needles via 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 additional needle configurations and materials.

Offline Pump Control

Precision Auger Pump performance integrates with your existing system via an offline controller, which enables full programming of dispensing parameters including acceleration, deceleration, speed, and dot size.

Easily interface with the controller via external signals to select multiple recipes or enable remote programming when 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 adjusts the dispense process in real time during operation - maximizing the precision of the pump's fine mechanics and control systems.

Real-Time Process Control (FPC) improves dispense pump repeatability by **monitoring and adjusting the dispense process in real time for optimal pump performance.**

FPC automatically Monitors & Adjusts fluid fed into pump

- Avoid starving and over pressurizing the pump reservoir.
- Consistent fluid supply enables higher repeatability over longer periods.

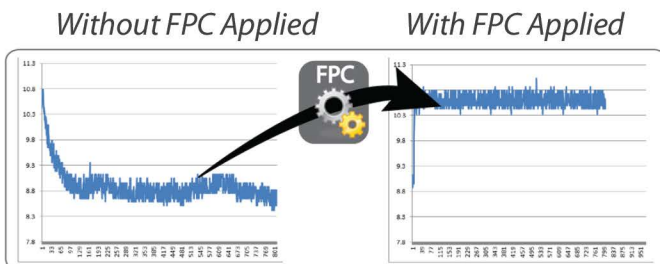


Compatibility and Integration

- 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



Results of Real Time Process Control

- Patented FPC system monitors incoming fluid pressure in real time.
- FPC automatically maintains constant feed pressure for uniform dispensing without operator intervention.



Optimize Both: Flow & Control

Time-Pressure Dispensing

Simple & Versatile Function Across Wide Viscosities

- Dispense lines, fills, and dots
- Great for short pot-life material
- Ideal for handheld use
- Disposable wetted parts
- No cleaning required
- Handles a wide range of viscosities



Simple & Versatile Dispensing

Operator dispenses fluid using pulsed air in two modes:

- Pulsed Mode - footswitch or start button activates dispensing for a set 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 with FPC further enhances dispensing results:

- Consistent fluid flow
- Programmable pressure settings and process pauses
- Programmable Controller stores up to 30 programs

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

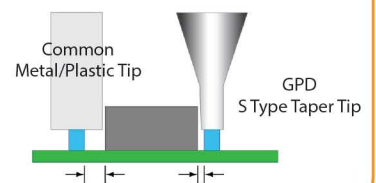
S Type Taper Nozzles

Unique Design = Numerous Benefits

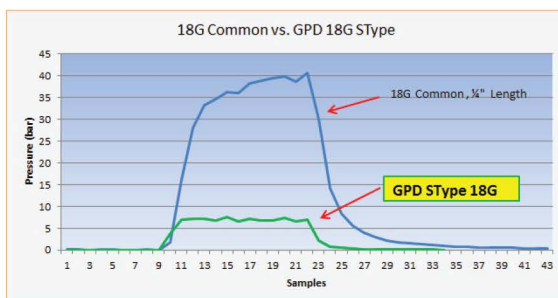
Improves dispensing results by reducing back pressure through a unique conical design, helping prevent clogs caused by pressure build-up in long tubes.



Dramatic difference in DISTANCE between needle tip & component



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



Benefits

- Use with any Luer nozzle system
- Better flow than standard 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

Summary

Machines

Machine Overview					
	UltraMAX™	MAX	MAX II	DS Series	Catalina Series
Work Area (XYZ)	355 x 355 x 50 mm (14" x 14" x 1.97")	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
Drive System	X,Y linear motors; Z servo	Servo	Servo	Servo	Stepping Motor
Accuracy	±0.012mm (0.0005")	±0.0254 mm (±0.001")	±0.0254 mm (±0.001")	±0.038 mm (±0.0015")	—
Acceleration	2g	0.7 g	0.7 g	0.5 g	0.6 g - 0.9 g
Linear Speed	2,000mm/sec (78.7"/sec)	686 mm/sec (27"/sec)	686 mm/sec (27"/sec)	508 mm/sec (20"/sec)	See details by model on Catalina Series product page
Footprint (XY)	92.7cm x 116.2cm x 181.8cm (36.5" x 45.75" x 71.58")	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")	
Pump Capacity*	1	Up to 2	Up to 2	Up to 3	1
Vision System	Automatic	Automatic	Automatic	Automatic	Automatic

*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, 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
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"

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