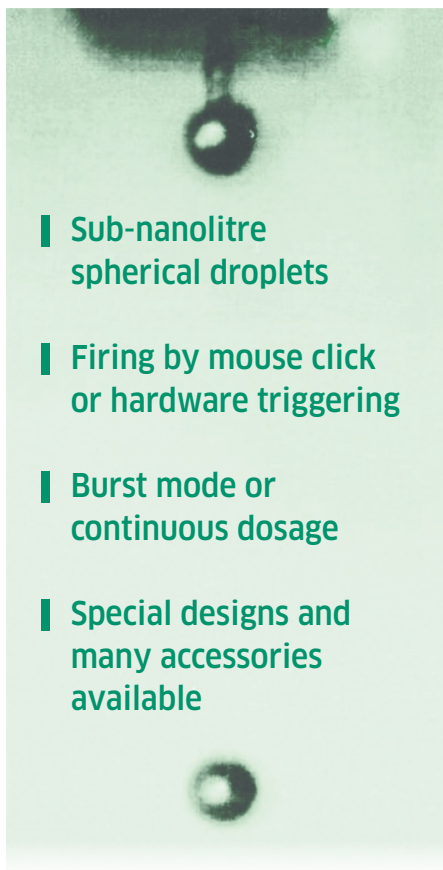


Nanolitre Dosage

Piezoelectric Microdispensers





Sub-nanolitre spherical droplets

Firing by mouse click or hardware triggering

Burst mode or continuous dosage

Special designs and many accessories available

GESIM's contact-free and valveless pipette heads are manufactured by microsystems technology. They eject a droplet when the piezoelectric actuator is deformed by an electrical pulse ('drop on demand').

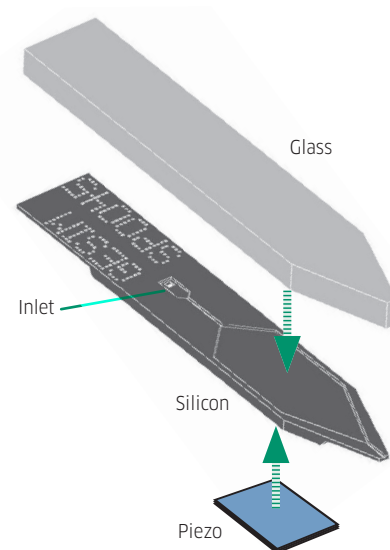
Applications: microarray spotting, screening, combinatorial chemistry, surface coating, sample preparation, generation of gradients by varying the droplet number, and more.

Standard pipettes SPIP and PicPIP

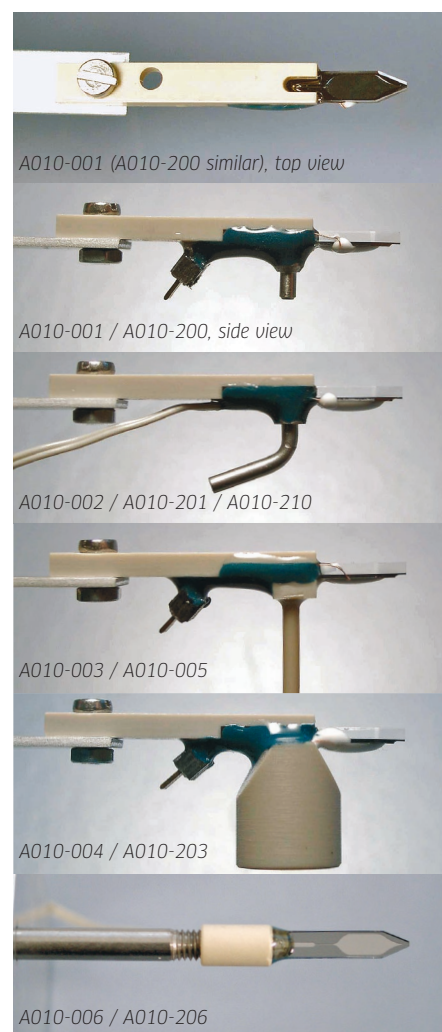
All dispenser types are identical, except for their nozzle sizes and shapes of the 'pump chamber'. Each one is available with different inlet adapters (to connect to tubes) and usually includes a mounting pad with two bore-holes. For some configurations, a dispenser with even lower droplet volume is available:

- Volume per droplet:
 - SPIP** 0.6 ... 1.1 nl
 - PicPIP** 0.1 ... 0.2 nl
 - PicPIP+** 0.05 ... 0.1 nl
- Low-power piezoelectric actuators (at about 70 V, pulse duration 90 µs)
- Pump chamber 0.8 µl
- Droplet frequency 16 ... 1000 Hz
- Max. flow SPIP/PicPIP: 70/12 µl/min
- Max. viscosity: 5 mPa·s (5 cP)
- Volume accuracy around 1% when dispensing 1000 droplets
- Surfaces in contact to liquid: SiO₂, PEEK, stainless steel (when used)
- Overall length 32 mm (except A010-006/ A010-206)

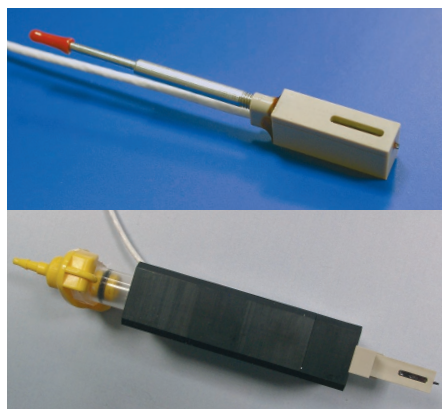
Please inquire for microdosage heads built to order (e.g. multiple-dosage or mixing heads).



How the dispensers are made: a channel system is etched in silicon, glass is anodically bonded, and the dispenser is cut out from the wafer. Piezo and cable/plug are attached, and the pipette mounted in the PEEK housing. Bottom: standard microdosage head types. The dispenser tip is 2.8 mm wide. Note the mounting pad with two 2.2 mm boreholes.



Article Number		Microdosage Heads and Micropipettes	Figure
<i>SPIP</i>	<i>PicPIP</i>	<i>PicPIP+</i>	<i>Housing / Fluid Connector</i>
A010-001	A010-200		Stainless steel inlet (perpendicular to dispense axis), mounting pad [OD 1.6 mm] ●
A010-002	A010-201	A010-210	Bent steel capillary (parallel to dispense axis), mounting pad ●
A010-003	A010-005		1/16 inch PEEK capillary, mounting pad [no metals in contact with liquid] ●
A010-004	A010-203		1/16 inch HPLC bushing (PEEK) [no metals in contact with liquid] ●
A010-006	A010-206		Cylindrical housing and fluid connector [for tubes] ●
A010-007	A010-202	A010-211	Stainless steel inlet (angled), electrical connector "LEMO" ●
A010-300	A010-302		Heatable dispenser with flange for tubes* ●
A010-214	A010-213	A010-212	Heatable dispenser with stainless steel inlet* ●
A010-301			Heatable dispenser with flange for cartridges* ●
A010-406	A010-406		Piezoelectric dispenser with Luer adapter (Drop size to be specified)
A010-408	A010-408		Piezoelectric dispenser with Luer adapter, heatable (Drop size to be specified)*
* Temperature control system A020-061 required			
Microdosage Heads with Backside Cartridge			
	A010-400		Dispenser head with PEEK housing, PEEK reservoir and sealings [Complete setup, dispense heads available for drop volumes from 10...600 picolitres, please ask]
	A010-401		Dispenser head with PEEK housing without reservoir
	A010-402		Cartridge for the dispense head (Spare part)
	A010-403		Accessory pack with filter and sealing (Spare part)



Heatable dispensers A010-300 (top) and A010-301 (bottom), the latter one with 3 ml heated reservoir that can be connected to compressed air



Stroboscope unit (A020-302) with holder for piezo dispenser (here: heatable and with cylindrical housing)



Diluter module with one channel (A072-102, external power supply not shown)

Selected liquids

Acetic anhydride, acetone, acetonitrile, betaine < 1 M, chloroform, cyclohexanone, dextrane solutions, detergents (e.g. 2% Triton X-100 or Tween-20), dichloromethane, DMF, DMSO, 1,4-dioxane, DNA (oligos < 3 mg/ml, plasmid < 1 mg/ml), ethanol, ethyleneglycol, N-FMOC-amino acids (200 mM in DMF), glues (Epoxy Technologies OG169, UVO-114, 301-2), glycerol < 50%, iodine (in THF/pyridine/H₂O 3:75:20:75), isopropanol, liquid crystals (Merck Licristal ZLI-2222, MLC-6681, 43 °C), MALDI matrix (e.g. CHCA in NMP, HPA in 20% acetonitrile), methanol, 1-methyl-2-pyrrolidone (NMP), 1-methylimidazole (16% in THF), NaCl < 3 M, PDMS (up to 30% in GBL), phosphoramidite in acetonitrile, PEG 10000 5%, polymers (P30T 1 mg/ml in trichloroethylene or chlorobenzene, PEDOT:PSS 0.14/2.6 %), Protein (< 5 mg/ml in PBS), silane (2 - 3% in propanol), 3× SSC (saline sodium citrate), THF, tetrazole (in acetonitrile), toluene, urea < 7 M, water

We offer designs for practically all applications, e.g. multiple dosage heads (for thicker lines) or mixing heads with two inlets (please inquire). Viscous solutions (e.g. glues, liquid crystals, semi-conducting polymers) can be dispensed at high temperature, up to ca. 700 mPa·s. A temperature controller is necessary.

Control unit 'multi-dos'

Fits up to eight controller boards. The software **mds8** drives all controller modules independently. In addition, the application programming interface in the **multi-dos** allows the integration of dispensers in customized environments, incl. LabVIEW, by sending string commands via the serial interface.

Items of shipment: controller for single microdispenser, wide-range power supply, serial cable (RS-232; USB adapter available), cable to microdispenser, trigger input, set-up and programming manual, Windows graphical control software. for multi-dos and other devices (stroboscope, diluter etc.). Dimensions: 19 cm × 14 cm × 5 cm.

Stroboscope for droplet analysis

Provides a live view of microdrops and thus helps to adjust dispensing parameters. Contains a yellow illuminating diode, a video camera and a holder for SPIP/PicPIP/PicPIP+. The stroboscope control board occupies a slot in the multi-dos.



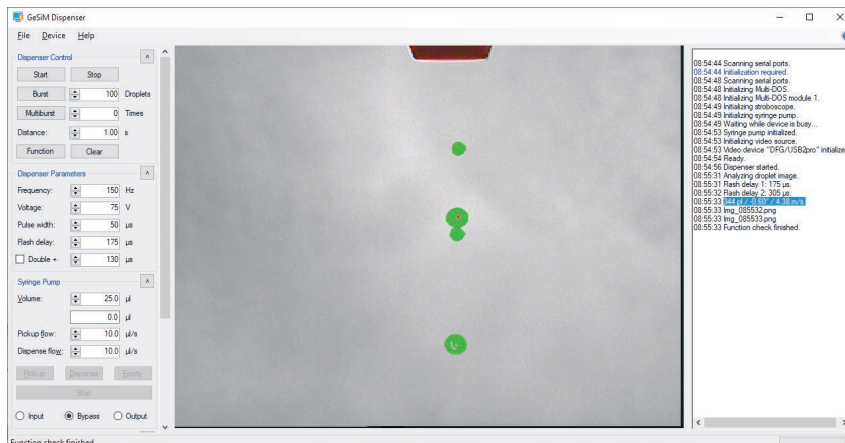
Top, **multi-dos 2** for two pipettes and a stroboscope (A020-301+303); bottom, temperature control unit (A020-061) for a heatable dispenser

Article Number	Description	Figure
Control Hardware		
A020-301	Control unit multi-dos 2 , with PC software [Comes with application programming interface for adaptation to external equipment]	●
A020-303	Extension module PM1 for multi-dos (additional dosage channel) [with cable]	
A020-306	Mainboard multi-dos 2	
A020-310	Front panel multi-dos 2 with sockets for four dispensers	
A020-004	Trigger button for manual burst release	
A020-016	2 m connector cable, dispenser → temperature control	
A020-061	Temperature control unit [for heatable pipette, similar to unit for Nano-Plotter]	●
Droplet Visualization		
A020-302	Stroboscope system, complete	●
A020-307	Extension module "Stroboscope" for multi-dos	
A020-010	A020-307 without video camera and illumination diode	
A020-305	LED with connection cable [naked, plugs into stroboscope control unit]	
<i>Please inquire for liquid handling accessories (diluters, tubes, filters, bottles etc.) and flow meters for droplet volume determination</i>		

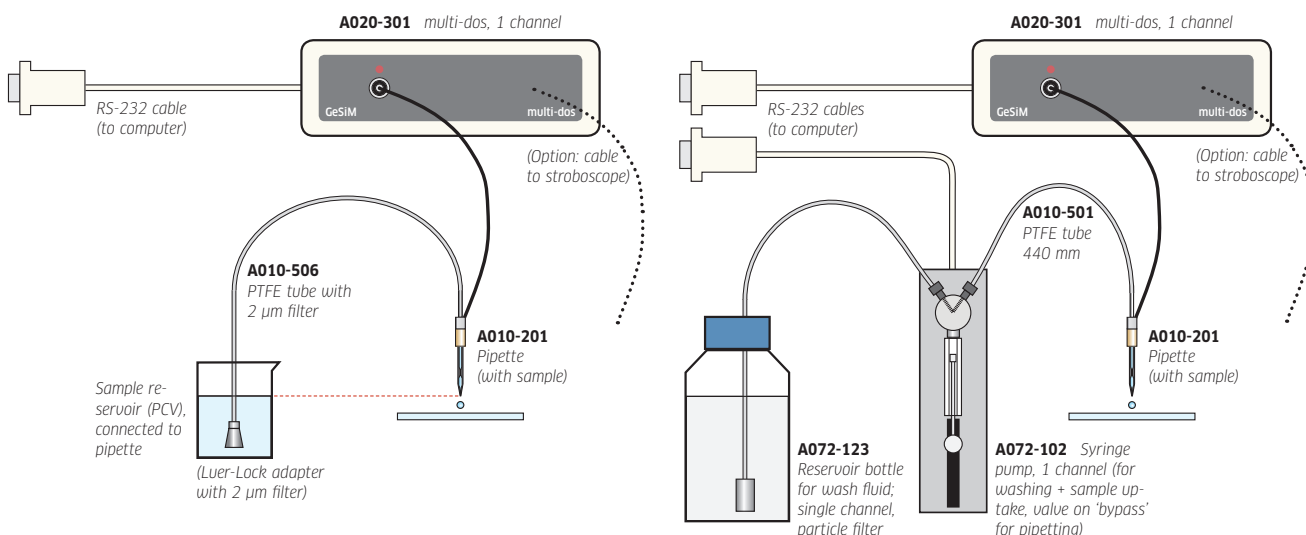


Syringe pump / diluter

Micro-dosage heads can be filled manually using a syringe. A diluter system consisting of a computer-controlled syringe pump with three-way valve gives you additional functions and reliability: flushing with system liquid (usually water) and automatic sample uptake from the nozzle, or feeding of the sample from the back via the fluidic inlet. Requires a second serial interface (RS-232). The syringe pump is also controlled by a string command instruction set. Please inquire for details.



'Dispenser' software for multi-dos, here showing a stroboscope picture with droplets ejected from a piezoelectric tip. The green boundaries depict automatically recognized droplets and you see droplets at two different times after triggering. This is used for the measurement of droplet size and speed.



Micro-dispenser set-up without (left) and with diluter (right).
PCV = pressure compensation vessel (to maintain fluid at the nozzle)

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