Nano-Plotter Product Overview

Microarraying and Picolitre Pipetting

▎ **Non-contact picolitre pipetting for high-quality spotting, be it microarrays, biosensors, or filling of microcavities**

▎ **Selection of pipette types to match the sample, not vice versa**

▎ **Up to 16 independently operating piezoelectric dispensers**

▎ **Many extras such as chilling, humidification, alternative dispensers, plate handler, and more**

The Nano-Plotter is probably one of the most flexible systems of its kind. It comes with a diverse number of pipettes (later upgrades possible) and a host of accessories to suit your needs.

So first select the platform, either the small NP 2.1 or the large NP 2.1/E. Then choose the number of inkjet dispensers (1 to 16).

Select the dispenser type, with droplet volumes ranging from 50 to 400 picoliters. Add a slide deck. If you have non-standard targets, you can either order a customized one or rearrange the standard deck to one with a flat surface. Other typical extras are humidifier and chiller.
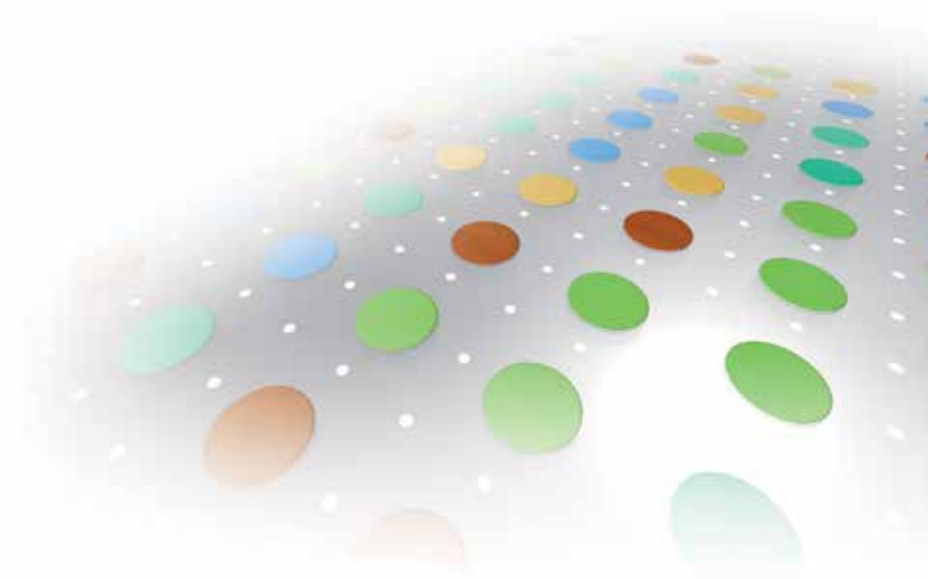
Possibilities do not end here. Select from special dispensers (heatable inkjet tips, adhesive dispensers, pin tools, etc.). You can also change the number or arrangement of microtiter plates. Or use a refrigerated plate handler for thousands of samples.

If you print biosensors, a microscope system for automatic image-based recognition of tiny structures is also available.

Contents
Nano-Plotter

Basic Configurations of your Nano-Plotter

The Nano-Plotter comes in **two sizes**, short and long:

• The **NP 2.1** for max. 55 slides

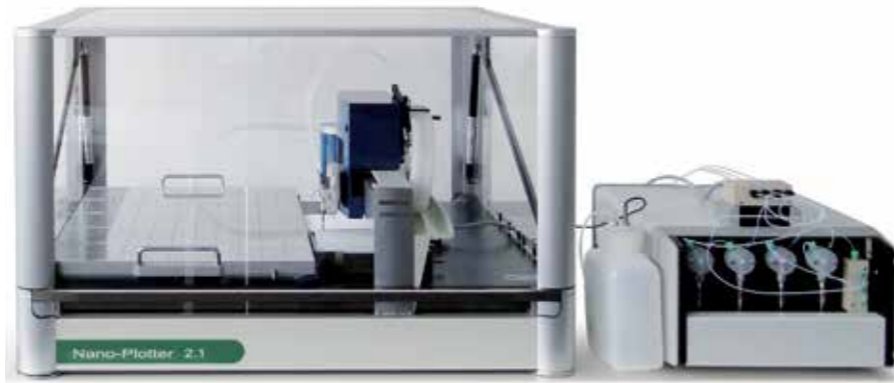• The **NP 2.1/E** for max. 120 slides

A stroboscope for droplet visualization and automatic pipette checking via "StroboCheck". is standard It allows graphical estimation of the droplet volume. The price of the instrument also includes software and piezoelectric tips (plus one spare).

Each "channel" (up to 16) consists of a piezo-electric microdispenser (Nano-Tip/Pico-Tip, see below), PTFE tube system with filters, and syringe pump (diluter) with three-way valve. Depending on the number of channels, the diluter housing comes in three different sizes; for more than eight channels, you get two diluter boxes. It is easy to add channels for increased throughput.

The pipette head comes in various configurations. The standard one holds up to eight pipettes in a 4.5 mm grid, allowing sample uptake from 96 and 384-well plates. The holder for 16 pipettes has two rows (9 mm apart) with 8 positions in a 4.5 mm grid. A

A060-304 *Nano-Plotter NP 2.1, four channels*

A060-328 *Nano-Plotter NP 2.1/E, eight channels*

A060-301 *Nano-Plotter NP 2.1, one channel, with simple MTP holder (A070-036) and no slide deck (minimal configuration)*

Article Number	Description	Figure
	Nano-Plotter Basic Configurations	
A060-301	Nano-Plotter 2.1, 1 channel	●
A060-302	Nano-Plotter 2.1, 2 channels	
A060-303	Nano-Plotter 2.1, 3 channels	
A060-304	Nano-Plotter 2.1, 4 channels	●
A060-306	Nano-Plotter 2.1, 6 channels	
A060-308	Nano-Plotter 2.1, 8 channels	
A060-316	Nano-Plotter 2.1, 16 channels	●
A060-321	Nano-Plotter 2.1/E, 1 channel	
A060-322	Nano-Plotter 2.1/E, 2 channels	
A060-323	Nano-Plotter 2.1/E, 3 channels	
A060-324	Nano-Plotter 2.1/E, 4 channels	
A060-326	Nano-Plotter 2.1/E, 6 channels	
A060-328	Nano-Plotter 2.1/E, 8 channels	●
A060-336	Nano-Plotter 2.1/E, 16 channels	
A060-205	Disposable Pack for rented instrument	
A060-300	Nano-Plotter 2.1 without dosage channels	

A060-316 *Arrangement ofdilutor boxes of a 16-channel NP 2.1*

6-channel version in which all pipettes are 9 mm apart is ideal for spotting into 96-well microtiter plates (MTPs) in "portrait" porientation. Please see below for details on

alternative dispensers.

The system price does not include a control computer. Please order a PC to ensure proper functioning.

Choose from slide decks of different size and for different targets, with extras including cooling, vacuum fixation, or spring-loaded holders. Number and arrangement of microtiter plate holders (also coolable) can be varied too; see next section.

Please ask about renting a Nano-Plotter. In that case, installation and training must be ordered and parts that get contaminated ("Disposable Pack") must be purchased.

Work Deck Configuration

The work space inside the Nano-Plotter (wash/dry stations, stroboscope, holders for source MTP and substrates) can be varied. An extra wash station for e.g. cleaning pipettes with alcohol is available.

An MTP holder and a deck for glass slides (max. 26 mm x 76 mm) is standard, but can be changed in many ways. Holders for 1–6 microtiter plates, mostly cooled, can be mounted. The "MTP frame" securely fixes flexible polypropylen plates on the instrument. Additional MTPs decrease slide capacity and thus require smaller slide decks. The drawings show typical setups.

Standard slide decks have locating pins, special and customized slide decks shallow "pockets". Locating pins can be turned upside down to create a flat surface for e.g. membranes (fixed with metal strips on the magnetic deck). Slides can be optionally cooled, like the source plate(s). The smooth operation of the Nano-Plotter does not require fixation of the slides, but if needed, spring-loaded or vacuum decks (no cooling) can be employed.
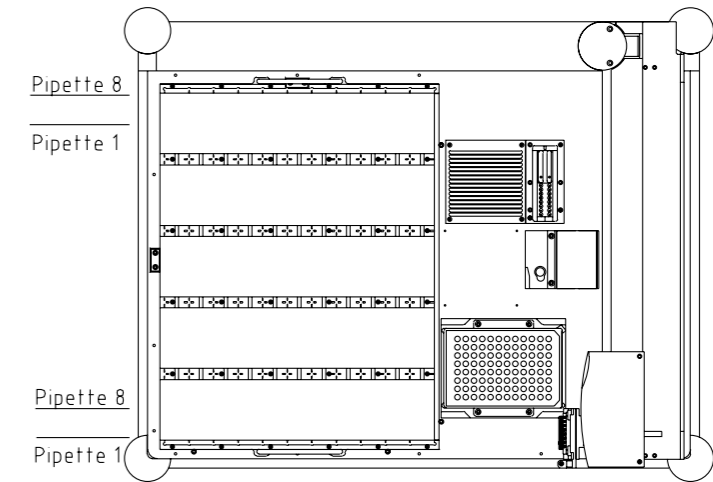
Printing into microtiter wells is often asked for. Decks for up to 12 MTPs (not cooled) are available. Source and target MTPs can be either in "landscape" or "portrait" orientation. Efficient transfer of samples into 96-well

Pipette 8

Pipette 1

Pipette 8

Pipette 1

A070-025,064 *NP 2.1 with standard cooled MTP holder and standard slide deck*

Pipette 8

Pipette 1

Pipette 8

Pipette 1
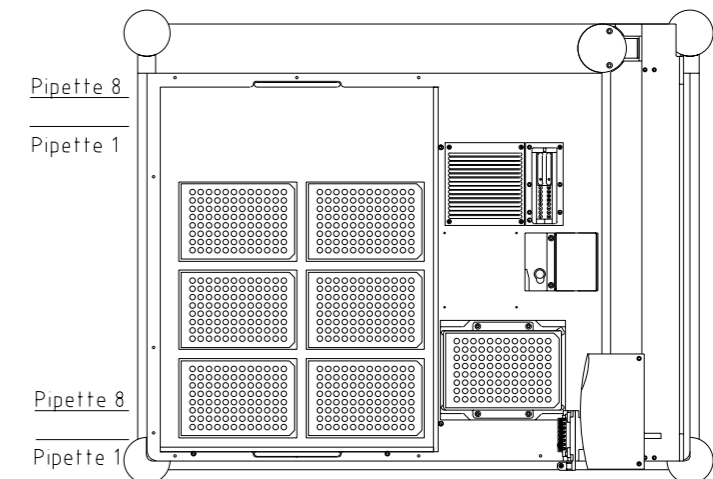
A070-025,060 *NP 2.1 with standard cooled MTP holder and 6-fold MTP deck*
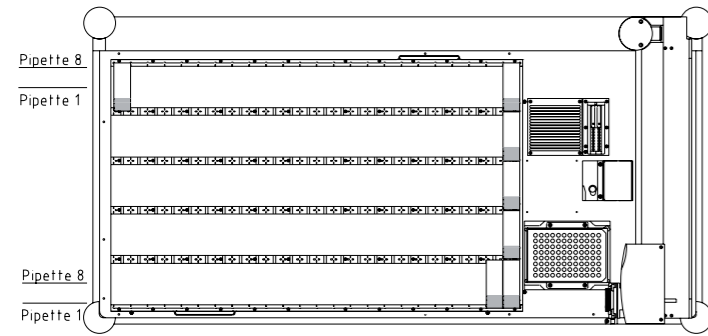
A070-025,066 *NP 2.1/E with standard cooled MTP holder and standard slide deck*

A070-025,037 *NP 2.1/E with standard cooled MTP holder, cooled 3-fold MTP holder, and 3x24 slide deck (A085-260)*

A070-025,062 *NP 2.1/E with standard cooled MTP holder and deck for 12 MTPs*

A 070-016 *Nano-Plotter with tips in second wash station (special setup with lid)*

A070-025,037 *Cooled holders for one and three MTPs in standard "landscape" orientation*
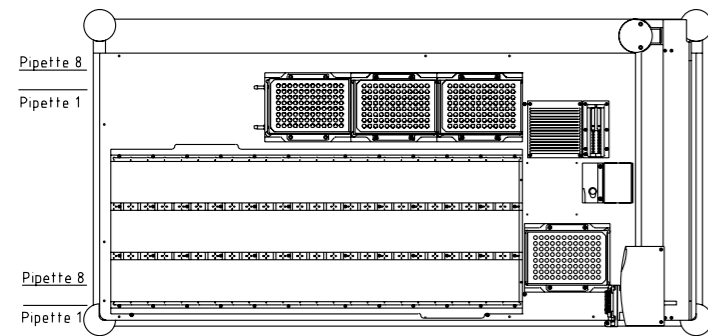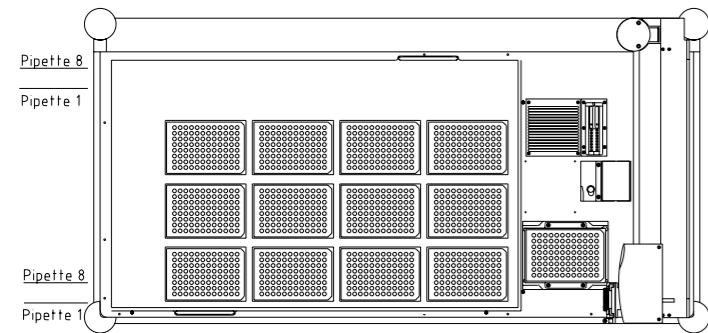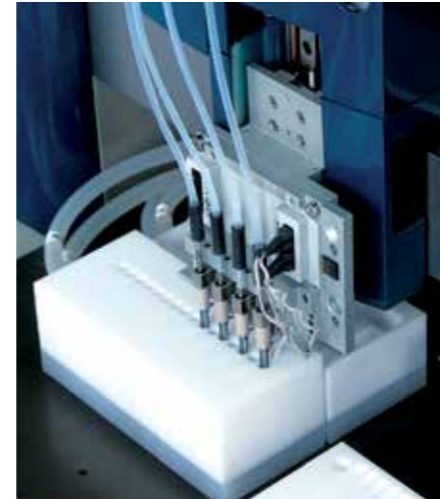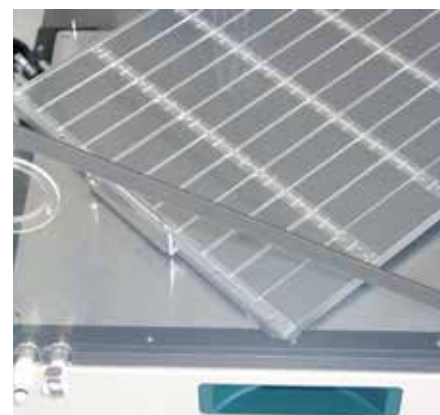

A070-057,064 *NP 2.1 standard slide deck with cooling chuck underneath*

A070-064 *Flipping the pins to obtain a flat deck*

A070-036 *Standard MTP holder without cooling*

Article Number	Description	Figure
	Wash Stations, MTP Holders and Slide Decks	
A070-016	Additional wash station NP2.1, 4 l bottles	●
A070-019	Additional wash station NP2.1, 10 l bottles	(●)
A070-025	Cooled microtiter plate holder	●
A070-030	MTP frame 96	
A070-036	MTP holder for Nano-Plotter, no cooling	●
A070-037	Cooled micro plate holder, 3-fold, for NP2.1/E, "landscape" orientation	●
A070-054	Diaphragm vacuum pump N820.3AN.18 for vacuum deck	
A070-055	Diaphragm vacuum pump N820.AN.18 for vacuum deck	
A070-056	Cooling chuck for small slide deck NP2.1/E (for 3 x 41 Zeptosens slides)	
A070-057	Cooling chuck for slide deck NP 2.1	●
A070-058	Cooling chuck for slide deck NP 2.1/E	
A070-059	Slide deck for NP2.1, "Zeptosens" slides, 6 x 18 pockets	●
A070-061	Slide deck for NP2.1/E, "Zeptosens" slides, 4 x 41 pockets	
A070-060	Work deck for 6 MTPs, NP2.1 (arraying into wells)	●
A070-062	Work deck for 12 MTPs, NP2.1/E, "landscape" orientation	●
A070-063	Work deck for 12 MTPs, NP2.1/E, "portrait" orientation	
A070-064	Slide deck for NP2.1 (standard)	●
A070-065	Slide deck for NP2.1, non-coolable, vacuum fixation	
A070-066	Slide deck for NP2.1/E (standard)	●
A070-067	Slide deck for NP2.1/E, non-coolable, vacuum fixation	
A070-071	Slide deck for NP2.1/E, "Nexterion"	
	"Portrait" MTP Holders and Special Slide Decks	
A085-200	MTP holder, cooled, portrait orientation	
A085-201	MTP holder, cooled, 2-fold, portrait orientation	
A085-202	MTP holder, cooled, 3-fold, portrait orientation	
A085-205	MTP holder, cooled, 6-fold, portrait orientation	●
A085-230	Slide deck for NP2.0/E, for membranes	
A085-237	Slide deck for 2.0/E, spring-loaded slide fixation	
A085-241	Slide deck for NP2.1, "Zeptosens", 5 x 16 pockets	●
A085-242	Slide deck for NP2.1/E, "Zeptosens", 3 x 41 pockets	●
A085-245	Slide deck for NP2.1/E, 2 x 24 positions (standard slides)	
A085-250	Slide deck for NP2.1/E, spring-loaded slide fixation	●
A085-252	Slide deck for NP2.1, spring-loaded slide fixation	
A085-260	Slide deck for NP2.1/E, 3 x 24 positions	●
A085-262	Slide deck for NP2.1/E, 4 x 24 positions	
A085-510	Slide deck for NP2.0, coolable	
A085-512	Slide deck for NP2.0/E, coolable	
A085-515	Slide deck for NP2.0, "Zeptosens"	

A070-059 *Small slide deck with pockets for 6 x 18 Zeptosens slides*

A085-241 *Small slide deck with pockets for 5 x 16 Zeptosens slides*

plates uses a Nano-Plotter with 6 channels in 9 mm grid, with all portrait-oriented MTPs. Extra-thin piezo dispensers (type "R", see below) are designed for maximum utilisation of the well bottom.

MTP holder or slide deck or both (by dai-sy-chaining) can be cooled for spotting at the dew point. The normal cooling chain consists of a coolable MTP holder, cooling chuck for slide deck (different sizes), recirculating chiller (Ministat), and insulated tubes with quick couplings. Please ask for other setups.

A085-205,242 *NP 2.1/E with 6-fold MTP holder and small slide deck for 3 x 41 Zeptosens chips*

Article Number	Description	Figure
	Chilling and Humidifying	
A070-026	Cooling system for MTP (incl. recirculation bath) for NP1.2 and NP2.x, complete	(●)
A070-029	Ultrasonic humidifier, NP2.1(/E), complete	●
A070-038	Complete cooling system for plates and slides (incl. recirculation bath), for NP2.1	●
A070-039	Complete cooling system for plates and slides (incl. recirculation bath), for NP2.1/E	●
A070-095	Kryo 30 (ethylenegylcol-based coolant, 5 liters)	
A070-650	Cooling tube set for slide deck and plate holder NP2.1	
A070-653	Cooling tube set for slide deck and plate holder NP2.1/E	
A070-654	Cooling tube set for 3-fold plate holder and small slide deck, NP2.1/E	
A070-655	Cooling tube set for coolable MTP holder, NP2.1(/E)	
A070-656	Cooling tube set for NP2.0	
A085-280	Cooling system for small slide deck for NP 2.1/E, complete	
	Automatic Source Plate Handling	
A070-041	Lid handler for MTP transfer	●
A070-043	Plate handler robot Cytomat 2C 425-LIN (Thermo Fisher Scientific),	●
	includes temperature and humidity control, capacity 40 plates	
A070-048	Adapter kit for coupling NP2.x to Cytomat 2C 425	●

A070-205 *Cooled holder for 6 MTPs, "portrait" orientation*

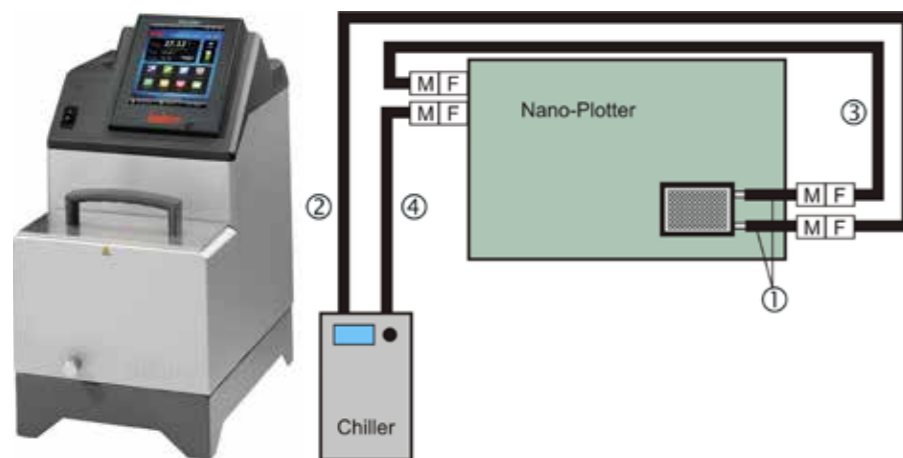**A085-250** *Slide deck for NP 2.1/E, spring-loaded*

A070-029 *Ultrasonic humidifier with waste bottle and tubes. As gravity is needed, a small table is included. The water reservoir and the flange for the aerosol tube are shown. at the top.*

A070-038,039 *Chiller and how it is connected to cooled slide deck and MTP holder via male/female (M/F) connectors*

If you have more samples than fit in the Nano-Plotter, use a Cytomat plate hotel whose interior is refrigerated and humidified. Add a plate handler for plates with lids.

A070-048 is additionally required and contains MTP transfer rail, open side window for NP2.x and rack system for 2C 425. Cytomat for NP2.x only; not available in certain countries.
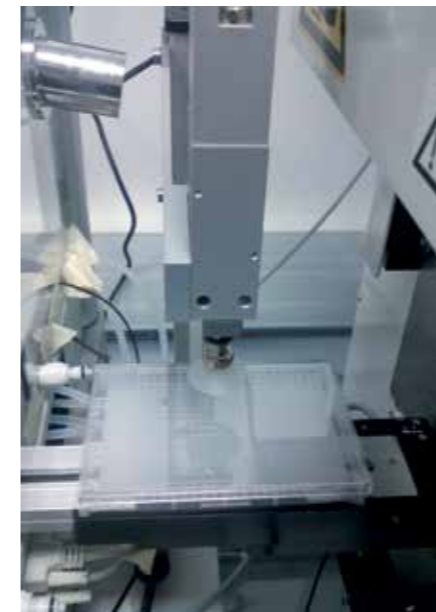
A070-041 *Lid handler for MTP transfer between Nano-Plotter and Cytomat*

A070-043,048 *Cytomate plate handler, connected to an NP 2.1/E via the adapter kit. This includes a stand on which the Nano-Plotter rests.*

Dispensers and Droplet Measurement

After your choice of platform size/layout/ cooling/number of channels, select the right piezoelectric dispenser. There are three standard dispensers:

- **Nano-Tip** for droplets of ca. 400 pl (range: 350–650 pl)

- **Nano-Tip A**, ca. 250 pl (range: 250–500 pl)

- **Pico-Tip**, ca. 60 pl (range: 50–90 pl; orifice size 25 µm, as opposed to 50 µm for the other tips)

The overall size and shape is the same for all tips. "J" refers to the standard holder type for quick tip mounting with one screw. Increase the number of droplets per spot for higher volumes. Max. viscosity is 5 mPa•s, so aqueous media with up to 30% glycerol are welcome. Nano-Tip HV is ideal for the viscosity of 50% glycerol (ca. 20 mPa•s).

For higher viscosities, Nano-Tips/Pico-Tips or Nano-Tip HV with attached heater exist. They require a heater/sensor cable in the rubber band in the Nano-Plotter (A070-450/451)

Cable
Steel capillary
Holder
PEEK housing
Si/glass channel
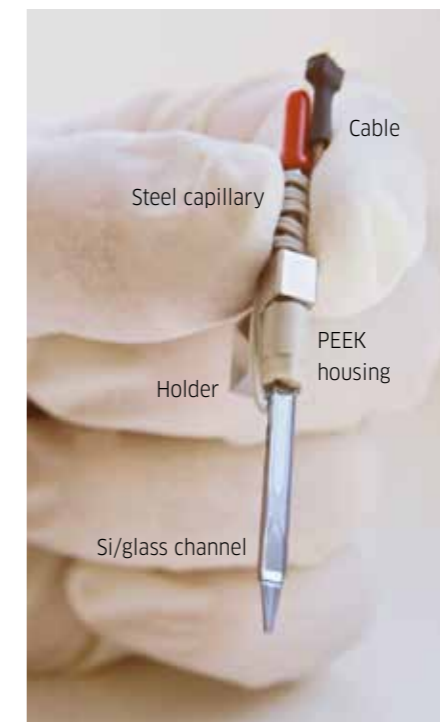
A 070-301 *Nano-Tip, special design with thinned glass around the nozzle (TGJ). The piezo actuator is on the back side.*

Pump chamber
Piezo
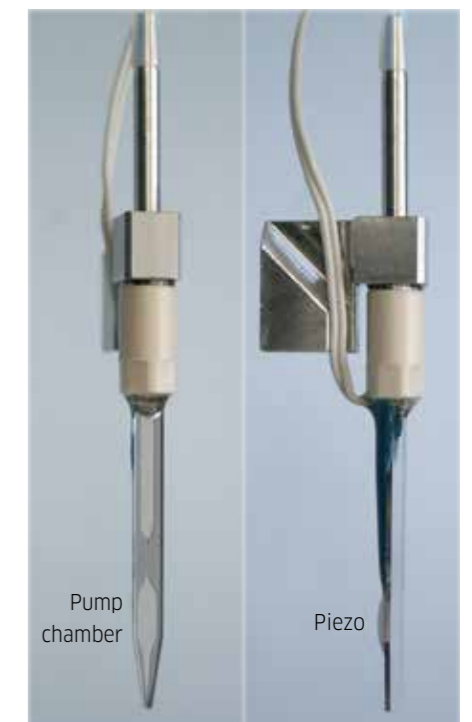
A 070-401 *Nano-Tip, front and side view; silicon and glass layers and the silicone cover on the piezo acuator can be seen (overall size of Pico-Tip and Nano-Tip A identical)*

Article Number	Description	Figure
	Piezoelectric Tips	
A070-301	Nano-Tip TGJ (ca. 400 pl; thin glass at the tip)	●
A070-401	Nano-Tip J (ca. 400 pl)	●
A070-402	Pico-Tip J (ca. 60 pl)	(●)
A070-403	Nano-Tip J, ground/sharpened tip	●
A070-404	Pico-Tip J, ground/sharpened tip	(●)
A070-502	Nano-Tip J, extra-long nozzle	●
A070-503	Nano-Tip A-J (ca. 250 pl)	(●)
A070-504	Nano-Tip A-J, ground/sharpened tip	(●)
A070-505	Nano-Tip HV-J, high viscosity	
A070-506	Nano-Tip AR-J (beveled, slim design for spotting into 96-well plates)	●
A070-507	Nano-Tip R-J (beveled, slim design for spotting into 96-well plates)	(●)
A070-508	Pico-Tip R-J (beveled, slim design for spotting into 96-well plates)	(●)
A070-509	Nano-Tip HV-R-J (high viscosity, slim design for spotting into 96-well plates)	(●)
A020-011	Temperature control box for heatable pipette	●
A070-450	Cable for heatable pipette, NP2.1	(●)
A070-451	Cable for heatable pipette, NP2.1/E	(●)
A070-560	Nano-Tip J-H, NP2.x, heatable (ca. 400 pl)	●
A070-561	Pico-Tip J-H, NP2.x, heatable (ca. 60 pl)	(●)
A070-562	Nano-Tip HV-J-H, NP2.x, high viscosity, heatable	(●)
	Flow Sensor for Droplet Measurement	
A070-020	Flow sensor controller, basic unit (spare)	(●)
A070-680	Flow sensor, 1 channel	
A070-681	Flow sensor, 2 channels	
A070-682	Flow sensor, 3 channels	
A070-683	Flow sensor, 4 channels	●
A070-687	Flow sensor, 8 channels	●
	"Passive" Tips	
A070-900	Dosage capillary, ID 0.8 mm, steel ("passive tip")	●
A070-901	Adapter for disposable plastic pipetting tips	●

A 070-401,502 *Normal Nano-Tip J and Nano-Tip with extra long nozzle. The white silicone cover on the piezo actuator is seen on the back side. Dimensions in mm.*

A070-403 *Nano-Tip with sharpened tip (A040-404 and A040-504 similar)*

A070-506 *Extra thin Nano-Tip AR-J (A070-507/508/509 similar)*

Nano-Plotter fluidic system. Fluidic stage 1 is for replenishment of the pressure compensation vessel and external washing of tips, fluidic stage 2 for internal wash, sample uptake, and dispensing (diluter valve on "bypass").
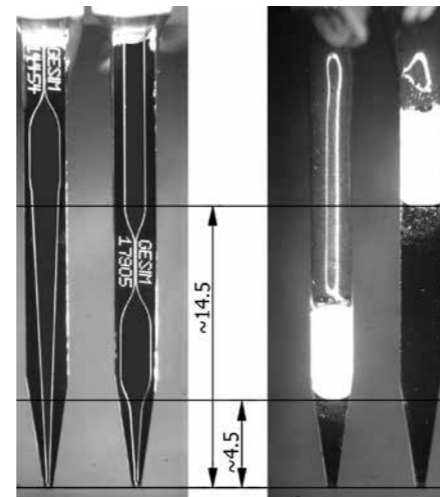
and a temperature control unit (A020-011, not included) for each heatable pipette. The machine must be prepared for this.

Extra-thin pipettes (type "R") allow better spotting into microtiter wells, and in pipettes with "extra long nozzles" the piezo is moved away from the orifice so that solvents do not reach its silicone cover. And then there are "passive" tips (capillary dispensers) that deliver fluids via syringe pump action, piezo cartridge dispensers (also heatable) with reservoirs but no fluidics, and third-party dispensers such as DELO-DOT adhesive dispensers or Parallel Synthesis silicon pins

for contact spotting.

During dispensing, the piezo pipette is connected with a "pressure compensation vessel" to protect the nozzle from running dry. Thus continuous dispensing exerts a flow in the tube that can be measured by our optional microfluidic thermocaloric flow sensor, leading to accurate droplet volume determination. (A rough volume estimate is obtained by rotating the stroboscope droplet contour.)

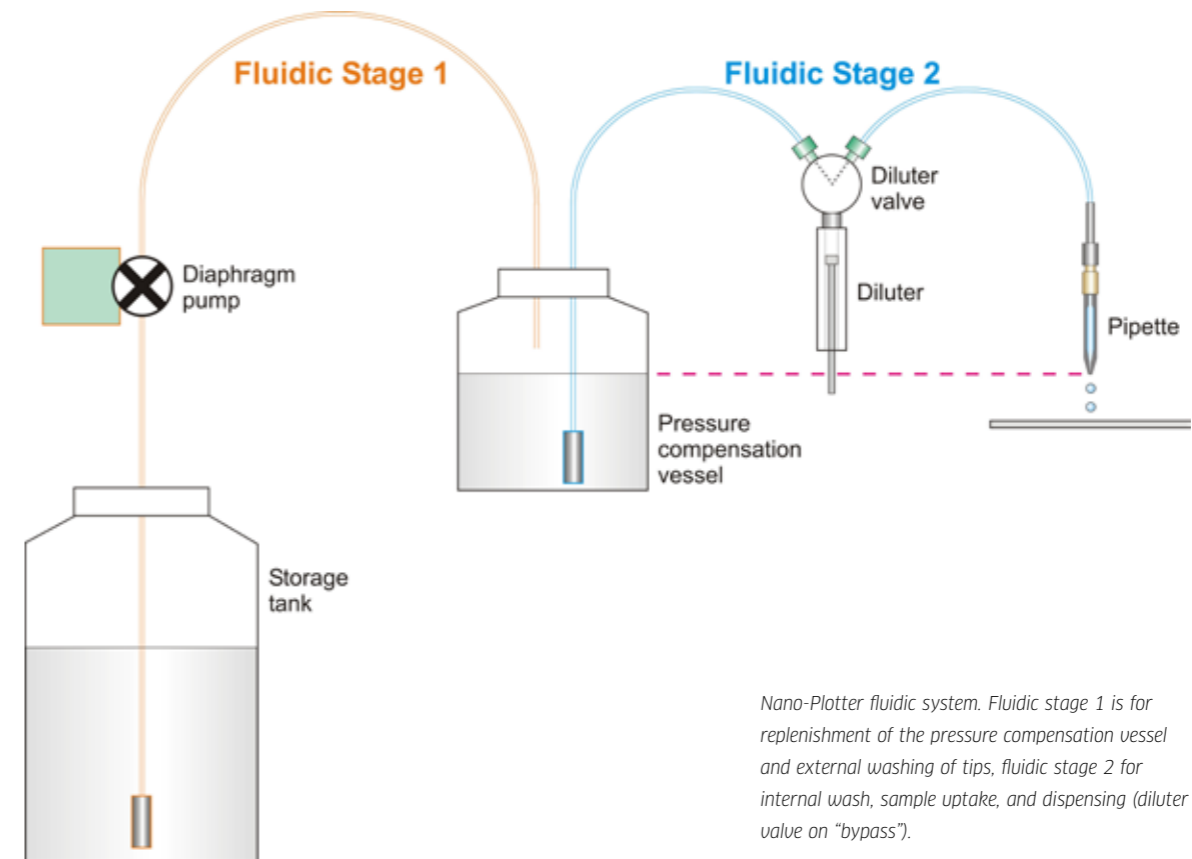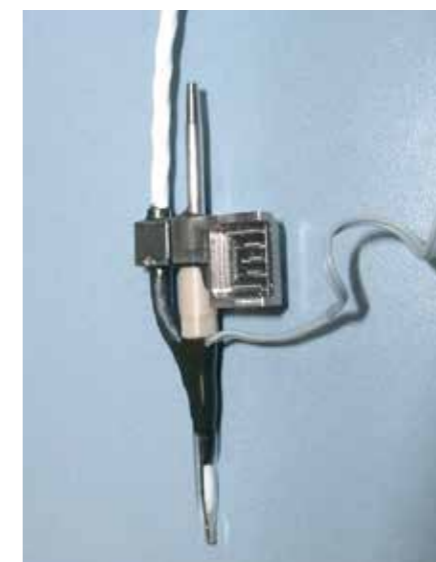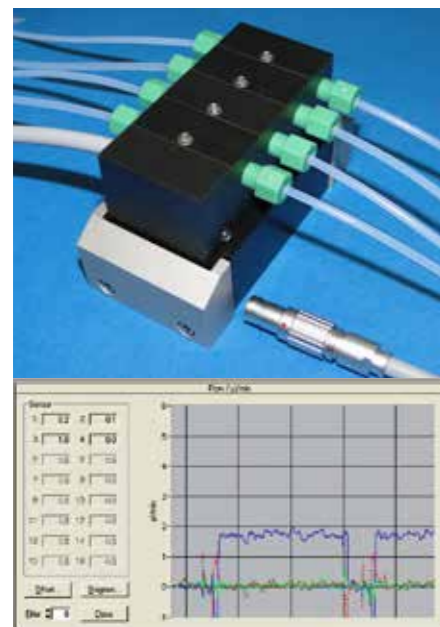Special liquid delivery systems are listed in later sections.

A020-011 *Temperature control box for one heatable pipette (A070-560/561/562)*

A070-560 *Heatable Nano-Tip J-H. Heatable Pico-Tip J-H (A070-561) and Nano-Tip HV-J-H (A070-562) look similar.*

A070-560 *Nano-Tip J-H in a Nano-Plotter with extra socket and cable for temperature control (A070-450; in the rubber band, not seen)*

A070-684 *Flow sensor, four channels, with controller and base unit. Bottom: flow diagram in the Nano-Plotter software.*


A070-687 *Flow sensor, eight (2 x 4) channels, with controllers and base unit, on an eight-channel dilutor box*

A070-900,901 *Dosage capillary ("passive" tip) and adapter for disposable plastic tips. The latter cannot be used together with piezoelectric tips; plastic tips are manually loaded and ejected.*

The bottom list shows dispensers with three or four pump chambers that produce thicker lines than the standard inkjet dispensers, and silicon-based pin tools from Parallel Synthesis Technologies, Inc., for contact spotting. Customization is possible.
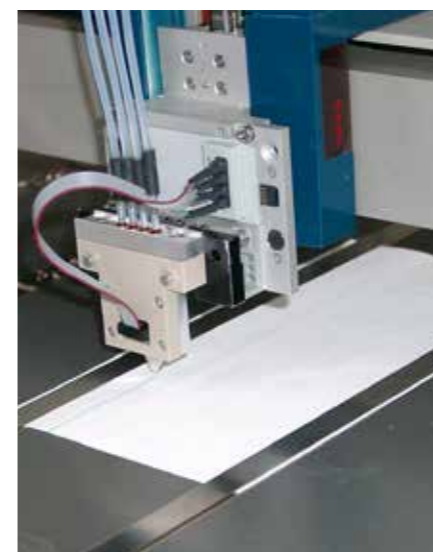
A700-670 *Dispense head with 4 piezo actuator chambers, printing a line on a membrane. The dispense head requires a 4-channel Nano-Plotter.*

Article Number	Description	Figure
	Cartridge Dispensers	
A010-400	Cartridge dispenser PEEK, with PEEK reservoir	●
A010-401	Cartridge dispenser PEEK, without PEEK reservoir	
A010-402	Cartridge dispenser PEEK – cartridge	
A010-403	Cartridge dispenser PEEK – filters and gaskets	
A010-404	Adapter cartridge dispenser / NP 2.x	
A010-405	Cartridge dispenser PEEK – adapter 3 ml cartridge	
A010-406	Cartridge dispenser PEEK, with Luer Lock adapter	●
	DELO-DOT Adhesive Dispenser	
A070-800	Nozzle ID 0.2 mm for DELO-DOT	
A070-850	Pressure/vacuum control, 1 channel	
A070-851	Pressure/vacuum control, 2 channels	
A070-852	Pressure/vacuum control, 4 channels	
A070-853	Pressure/vacuum control, 8 channels	
A070-854	Compressor, 4 l tank	
A070-904	DELO-DOT piezo jet valve, to be mounted on NP2 head	●
	Special Dispensers	
A700-670	4-fold piezo dispense head (4 nozzles, pitch 250 µm, housing, for line printing)	●
A700-671	3-fold piezo dispense head (3 nozzles, pitch 250 µm, housing, for line printing)	
A700-900	Silicon pin tool, slit size 1.67 mm x 0.3 mm x 0.2 mm	(●)
A700-901	Silicon pin tool, slit size 0.27 mm x 0.3 mm x 0.2 mm	(●)

Alternative Dispensers (Selection)

Although emphasis is on inkjet microarray-inig, a range of other dispensers has been built into the Nano-Plotter. The first list shows piezo dispensers with cartridge (i.e. reservoir, no fluidics) and their accessories. With no fluidics, they can neither aspirate samples from wells nor be flushed via syringe pump action. They are designed for different droplet sizes. Please ask for details.

As an example for third-party devices, the DELO-DOT adhesive dispensing system is designed for extremely viscous thixotrophic fluids; it needs compressed air, disposable cartridges/caps, and cleaning fluid. Please discuss the configuration with GESIM, as major refurbishing is necessary, also reducing the printable area. Piezo dispensers and DE-LO-DOT can be used in the same instrument (also using the optical target identification), but not at the same time.

A010-400 *Cartridge dispenser PEEK, printing arrays onto water-sensitive paper*

A010-406 *Cartridge dispenser with Luer Lock adapter*

A700-900,901 *Nano-Plotter head with holder for pin tool contact dispensers. Pin tools require a spring-loaded slide deck.*
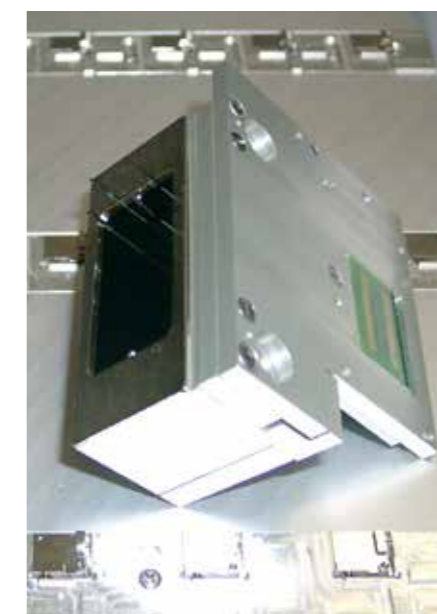
A700-900,901 *Pin tool holder, upside down on a spring-loaded slide deck*

A070-904 *DELO-DOT piezo valve on Nano-Plotter print head, with cartridge for adhesives. Requires nozzle and controller (e.g. A070-850).*

Optical Target Identification

Biosensors and other special targets can be spotted with GESIM's automatic image processing/identification module (A070-017). It consists of basic hardware (video microscope with holder mounted on the print head), illumination (coaxial LED light is standard, but can be replaced by other light sources), and extra software.

Analogue video signals are converted to digital pictures via a converter, normally a USB device.

The **SpotFrontEnd** software (included in A070-017) lets you graphically define complex chip layouts with one or two alignment/fiducial marks (crosshairs, circles, metal pad corners, but also edges of conducting paths, nanowell arrays, or defined by clicking). Hundreds of spots at arbitrary positions and complex spot plans (wells –> spots) can be defined, exported to a file, and spotted using the Nano-Plotter control software (NPC16). Optical target recognition also works with other dispensers such as pin tools and DELO-DOT.

The microscope camera reads out the position of your chips, then a test spot is produced for each sample, usually on water-sensitive paper (A072-115), for finer position correction. Finally the spot layout defined by SpotFrontEnd is used for accurate spotting onto all chip features. Spotting is sequential, i.e. actuating one tip at a time. Have your chips checked at GESIM how they are recognised and how spots look.

Microscope and software can be ordered separately. One can e.g. use SpotFrontEnd without microscope to define complex spotting schemes that do not fit in a rectangular grid.

| Article Number	Description	Figure
	Optical Systems and Software	
A070-012	Stroboscope for Nano-Plotter NP2	●
A070-017	Optical target identification (NP2.x)	●
A070-018	Video capture card (PCI)	
A070-910	Video-to-USB converter	●
A070-023	Video microscope NP2.x without alignment software	●
A070-908	LED coaxial illumination for microscope	(●)
A070-073	Target visualisation camera for NP2 (only to see tips, not for image processing)	●
A070-085	NPC16 control software (Windows XP – 8.1)	
A070-086	SpotFrontEnd, image processing software without microscope	●
A070-090	Windows PC + 22" monitor	
A070-091	Windows Notebook	
A070-911	Serial cable (RS-232)	●
A070-920	Computer keyboard, UK	
A085-010	Video microscope without illumination	(●)

A070-012 *Stroboscope (spare, top) with LED, mirror, camera, and cable. Bottom: image processing of the stroboscope droplet pattern. Valid pixels (green) are used for droplet volume calculation.*
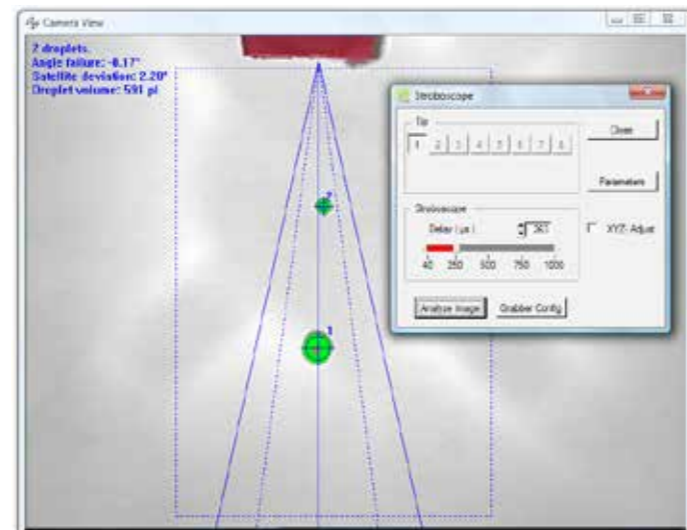
A070-017,023 *Video microscope with ring light above microstructured wafer. Note that the microscope holder must be changed when also using the target visualization camera (below) or a two-row pipette holder (A072-006).*

A070-073 *Target visualisation camera, mounted together with video microscope (A070-023); both illuminated*
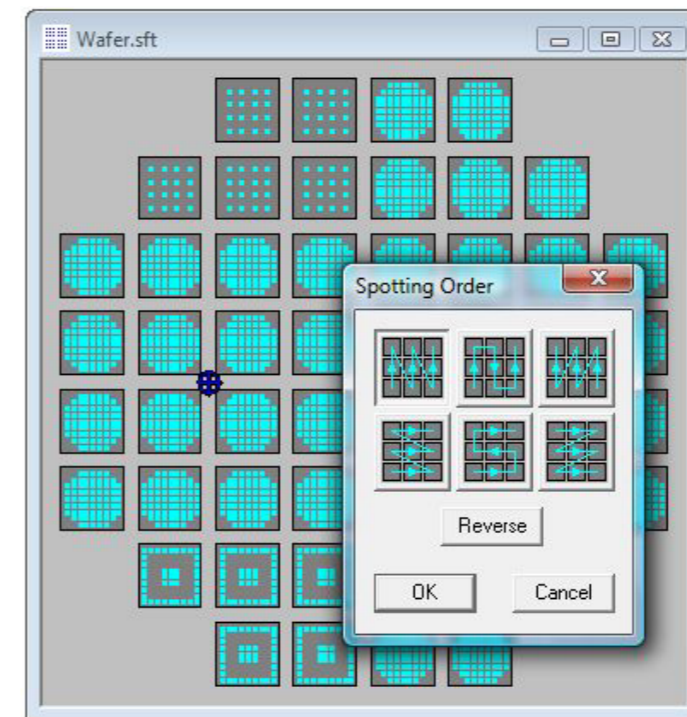
A070-086 *SpotFrontEnd software (detail) to define complicated chip layouts*

A070-910 *Video-to-USB converter, shown without video and USB cables*

A070-911 *Serial cable (RS-232)*

Nano-Plotter Spare Parts

Fluidic System Accessories

Use these tables to look for alternative system setups and spare parts. Replace tubing and filters on a regular basis. So put the following items on your shelf to quickly replacing worn-out or malfunctioning parts:

- Spare piezoelectric pipettes, and pipettes dispensing in another volume range, or special/heated dispensers

- Water-sensitive paper test strips and drying fleece (A072-115/116)

- Full set (better more) of green 2 µm particle filters (A072-120) that sit at the print head

- 20 µm particle filters for pressure compensation bottle and system fluid reservoir (A072-121/146)

- 250 µl dilutor syringes (A072-106) and dilutor valves (A072-111)

- PTFE tubes connecting pipettes with print head (A072-171), best also all other PTFE tubes of fluidic stage 2

- Z-level sensor (A072-223) and a few hexagon mounting screws (A072-509) for the pipette holders

- Set of silicone tubes (A072-404)

- Level sensor for either system fluid reservoir or pressure compensation bottle and level sensor for wash bowl

- Extra slide holder, either to load one while the other one is in the instrument or for other slide sizes

Replace filters (A072-120/121/146) once every year. Replace pipette PTFE tube (A072-171) when needed (every 1–2 years) and the other PTFE tubes and the silicone tubes (A072-404) when dirty, every 1–2 years. Replace dilutor syringes completely when the gasket gets leaky. Clean or replace bottles regularly.

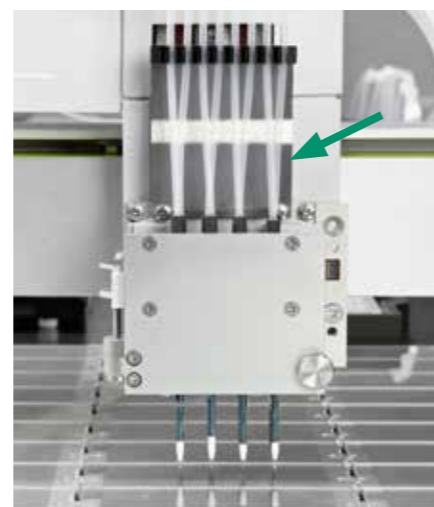| Article Number	Description	Figure
	Pipette Head Accessories	
A072-005	Pipette holder (1x8) for Nano-Plotter (2.x)	●
A072-006	Pipette holder (2x8) for Nano-Plotter (2.x)	●
A072-015	Dummy tip type "J"	●
A072-040	Z-module without control boards for NP2.1(/E)	
A072-509	Hexagon screw for pipette fixation	
A072-516	Fixation plate for pipette tubes for NP2.x (max 8 channels; minimises vibration)	●

A072-005 *Pipette holder (1x8) for Nano-Plotter (2.x), with 8 J-type pipettes mounted. The holder is fixed with only 4 screws on the Z-drive.*

A072-006 *Pipette holder (2x8) for Nano-Plotter (2.x), with 2 rows (first one swivels out) in 9 mm distance. Here, 8 J-type pipettes are mounted for spotting into 96-well plates.*

A072-015 *Dummy tips to test settings and pipetting programs*

A072-516 *Fixation plate for pipette tubes for less tube vibration during movements*

Article Number	Description	Figure
	Pumps and Syringes	
A072-095	System fluid pump (internal)	●
A072-100	Dilutor module XCalibur (new version)	●
A072-101	Dilutor module XP3000 (old version)	
A072-102	1-Channel diluter (1-channel housing), complete	●
A072-104	2-Channel diluter (4-channel housing), complete	●
A072-105	3-Channel diluter (4-channel housing), complete	
A072-107	1-Channel diluter (4-channel housing), complete	
A072-108	4-Channel diluter (4-channel housing), complete	●
A072-109	8-Channel diluter (8-channel housing), complete	●
A072-112	Dilutor upgrade 1 channel –> 4 channels	
A072-111	Dilutor valve XP3000 (old version)	●
A072-177	Dilutor valve XCalibur (current version)	●
A072-148	4-fold fluid distribution block (with boreholes)	●
A072-162	Blind screw, black, 1/4"-28	●
A072-106	Dilutor syringe 250 µl	●
A072-401	Dilutor syringe 2.5 ml	●
A072-402	Dilutor syringe 50 µl	●
A072-409	Dilutor syringe 100 µl	●
A072-421	Dilutor syringe 5 ml	●

A072-095 *System fluid pump, built into the electronic control unit*

A072-100 *Dilutor module XCalibur (current module), naked, in protection foil*

A072-104 *Two-channel dilutor box in four-channel housing with internal power supply, with 2-fold fluid distribution block.*
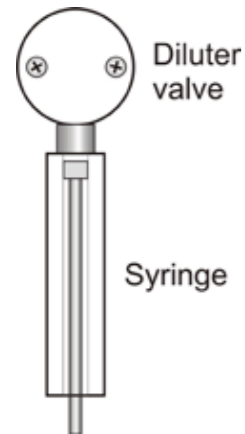

A072-108 *Four-channel dilutor box, with 4-fold fluid distribution block (A072-148) on the right*

A072-109 *Eight-channel dilutor box, contains two 4-fold fluid distribution blocks (A072-148)*

A072-102 *One-channel dilutor, comes with external switching power supply. The built-in dilutor module, XCalibur, contains a 250 µl syringe (A072-106) and a three-way-valve (A072-177).*
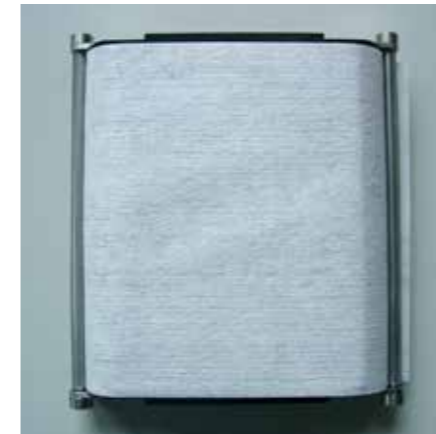
A072-106,111 *Schematic drawing of dilutor syringe and three-way valve*

A072-111,177 *Dilutor valves for XP3000 (old, left) and XCalibur (new, right)*
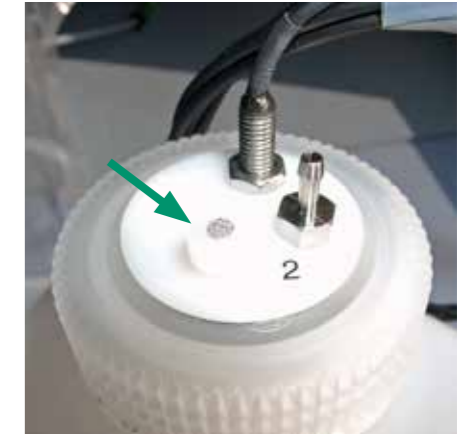

A072-148,162 *4-fold fluid distribution block (with boreholes), for 4 channels each, and blind screws*

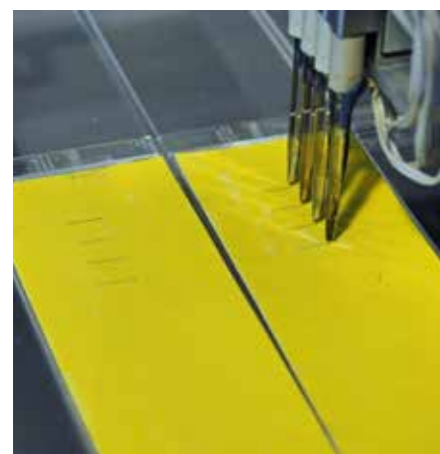**A072-116** *A dry fleece on the "Soft Pad" dry station*

A072-120,121 *Particle filter for pipette tube (2 μm, green, also in PEEK) and 20 μm filter for pressure compensation vessel (A072-146 is similar, but adapted to a larger tube diameter)*

A072-122 *Air filter plug in the cap of the pressure compensation vessel*

A072-402,409,106,401,421 *Dilutor syringes 50 μl, 100 μl, 250 μl, 2.5 ml, 5 ml; more sizes available*

Article Number	Description	Figure
	Consumables	
A072-115	Water-sensitive test strips	●
A072-116	Dry fleece for Nano-Plotter	●
	Particle Filters and Bottles	
A072-120	Particle filter 2 μm for pipette tube (stainless steel)	●
A072-121	Particle filter 20 μm for pressure compensation vessel	●
A072-122	Air filter plug for pressure compensation vessel	●
A072-126	System liquid container 4 l without cap	(●)
A072-128	System liquid container 4 l, complete	●
A072-129	Pressure compensation vessel without cap and sensor	(●)
A072-130	Pressure compensation vessel (NP1.2/NP2), complete	●
A072-132	System liquid container 10 l without cap	
A072-146	Particle filter 20 μm for system fluid container	(●)
A072-501	Waste container 4 l, complete (NP2.x)	●
A072-506	Particle filter 2 μm for pipette tube (PEEK)	
	Tubes	
A072-140	PTFE tube fluid distribution block -> pressure compensation vessel	●
A072-171	PTFE tube for pipette (NP2.x)	●
A072-172	PTFE tube fluid distributor -> dilutor	●
A072-174	PTFE tube dilutor –> pipette head (NP2.x)	(●)
A072-176	PTFE tube dilutor –> pipette head (NP2.x/E)	(●)
A072-151	Silicone tube no. 4; main unit –> wash station	●
A072-152	Silicone tube no. 5; wash station –> main unit	●
A072-153	Silicone tube no. 1; system liquid container –> main unit	●
A072-154	Silicone tube no. 8; main unit –> waste container	(●)
A072-155	Silicone tube no. 2; main unit –> pressure compensation vessel	(●)
A072-404	Complete tube set silicone (NP1.2/NP2)	●

A072-115 *Water-sensitive test strips in the Nano-Plotter*

A072-128,501 *Wide-mouth system liquid and waste containers, complete.*

A072-130,140 *Pressure compensation vessel, complete (tubes and filters not included) with two thick PTFE tubes (fluidic stage 2) connecting to two fluid distribution blocks*

A072-171, 171 *PTFE tube for pipette, to be mounted at the pipetting head (top) and PTFE tube fluid distributor –> dilutor valve (bottom)*

A072-151,152 *Silicone tubes no. 4 and 5 of fluidic stage 2, for wash station*

A072-153 *Silicone tube no. 1; system liquid container –> main unit (A072-154/155 similar)*

A072-404 *Complete tube set silicone of fluidic stage 1, consisting of tubes no. 1, 2, 4, 5, 8 (A072-151 to A072-155)*

Spare Parts and More for Special Cases

These parts are only needed when defect. In many cases they will be exchanged at the factory. Having extra gas springs for the Nano-Plotter door is beneficial; they are easy to replace.

IMPORTANT: Do not buy any other power supply. It is specially modified for the Nano-Plotter.

Keep the original box for your Nano-Plotter including all foam parts and metal clips for shipping the Nano-Plotter, as in most cases a serious defect cannot be corrected on-site. GESIM will charge for a new crate if the original one is lost.

Article Number	Description	Figure
	Electronic Components	
A070-022	Switchable power supply	●
A072-016	Humidity sensor, complete	●
A072-203	Video cable for pipette head	●
A072-223	Z-level sensor (NP2.x)	●
A072-221	Liquid level sensor wash station (NP2.x)	●
A072-226	Liquid level sensor waste / pressure compensation vessel	
A072-230	Slide-in electronics module (NP2.0)	(●)
A072-296	Slide-in electronics module (NP2.1)	●
A072-250	Z-motor unit NP2.1	
A072-252	Pipette head electronics NP2.1, complete	
A072-253	Pipette head electronics NP2.1: pipette controller board	●
A072-254	Pipette head electronics NP2.1: Z-axis controller board	●
A072-255	Pipette head electronics NP2.1: Z-limit board	
A072-260	Flex cable with ribbon cable for Y-axis NP2.1	
A072-262	Flex cable with printed circuit board for X-axis NP2.1/E	●
A072-264	X1 board for NP2.1	●
A072-602	USB2.0-to-RS232 adapter	●

A072-016 *Humidity sensor of the humidifying system*

A070-022 *Switchable power supply, 36 V, grounded, shown without power cord*

A072-221 *Liquid level sensor for the wash station*

A072-226 *Liquid level sensor in the cap of the waste bottle (sensor for pressure compensation bottle identical)*
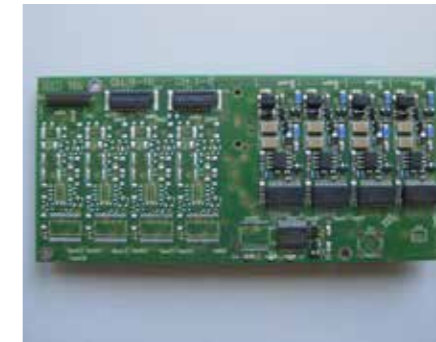

A072-203 *Video cable for pipetting head*

A072-223 *Z-level sensor (NP 2.x). The switch point position relative to the pipette tip (printed number) is electronically stored in the device.*
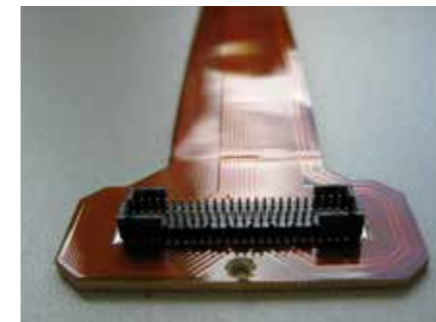

A072-296 *Slide-in electronics module (NP 2.1; A072-230 similar); pumps and valves on the right*
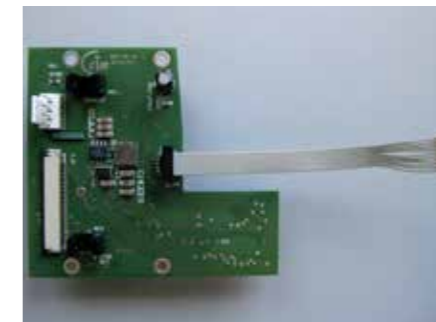

A072-253 *Pipette controller board (8 channels)*

A072-254 *Z-axis controller board*

A072-262 *Flex cable for X-axis, NP 2.1/E (extension board not shown)*

**A072-264** *X1 board for NP 2.1 for controlling stepping motor X1*

A072-602 *USB-to-RS232 adapter cable*

Article Number	Description	Figure
	Miscellaneous Mechanical Parts	
A072-036	Tooth belt NP2.1 X-axis, naked	●
A072-038	Tooth belt NP2.1/E X-axis, complete	(●)
A072-060	Side screen left, NP2.1	●
A072-189	Aerosol tube for humidifier, with connecting piece	●
A072-185	Rubber band for PTFE tubes, NP2, single	●
A072-187	Rubber band for PTFE tubes, NP2/E, single	(●)
A085-520	Rubber band, 16 channels, with video cable and tubes, NP2.x	
A085-521	Rubber band, 8 channels, with video cable and tubes, NP 2.x/E	
A072-515	16-channel rubber band for PTFE tubes, NP2 X350 (double)	●
A072-420	Working plate NP2.1 (metal plate)	
A072-505	Gas pressure spring for NP2.0/E lid	(●)
A072-510	Gas pressure spring for NP2.1 lid	●
A072-513	Gas pressure spring for NP2.1/E lid	(●)
A072-514	Gas pressure spring for NP2.0 lid	(●)
A072-530	Tool set for Nano-Plotter	●
A072-531	Tweezers for glass slides	●

A072-036 *Tooth belt for Nano-Plotter X-axis, pre-cut, naked (A072-038 similar)*
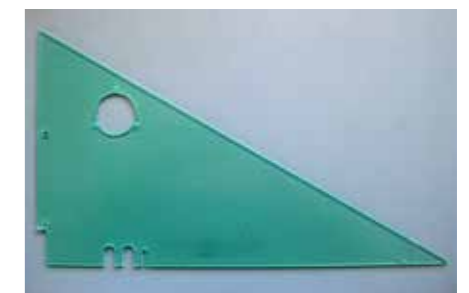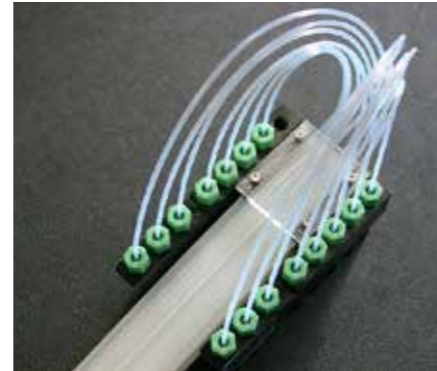

A072-060 *Side screen left, NP 2.1 (with green protection foil)*

A072-189   *Aerosol tube for humidifier. Inset: connecting flange.*

A072-185   *Rubber band for PTFE tubes, single (for max. 8 channels), built into Nano-Plotter NP 2.1 (A072-187 is longer), with PTFE tubes A072-174*

A072-515   *Rubber band for PTFE tubes, single (i.e. for max. 16 channels), without video cable. The upper end mounted on the print head is shown.*

A076-011   *Packaging for 8-channel dilutor, with foam pads; dilutor not included (A076-012 smaller)*

A076-204   *Large membrane box 147 (piezo pipettes not included)*

A076-205   *Small membrane box 45 (piezo pipette not included)*

A072-510   *Gas pressure spring for NP 2.1 lid (A072-505/513/514 similar, but springs for NP 2.1 and 2.1/E have different tension)*

A072-530,531   *Tool set for Nano-Plotter; tweezers for slides on the right*

A076-004   *Foam pads for NP 2.1/E crate (A076-003 similar), plus spring clips*

Service and Instrument Upgrades

Piezo pipette repair/cleaning is only charged for if it is successful. If not, it will be discarded, with your consent. Sending malfunctioning piezo dispensers is thus risk-free.

For Nano-Plotter channel upgrades, certain parts (dilutor box) must be shipped to GESIM for refurbishing. The main unit need not necessarily be shipped, as exchange of the rubber band with PTFE tubes is easy.

Article Number	Description	Figure
	Service	
A080-008	Travel expenses	
A080-009	Accomodation expenses per night	
A080-010	Installation Nano-Plotter, per hour	
A080-011	Repair (work), per hour	
A080-012	Warranty extension Nano-Plotter	
A080-413	Spotting service	
A700-700	Repair pipetting tip	
A700-701	Exchange of the electrical connector of the tip	
A700-702	Pipette cleaning	
	Nano-Plotter Upgrades	
A085-045	Upgrade NP2.1; 1 –> 2 channels	
A085-049	Upgrade NP2.1; 1 –> 3 channels	
A085-050	Upgrade NP2.0; 1 –> 4 channels	
A085-051	Upgrade NP2.1; 4 –> 16 channels	
A085-052	Upgrade NP2.1; 4 –> 8 channels	
A085-053	Upgrade NP2.1; 2 –> 4 channels	
A085-060	Upgrade NP2.1/E; 1 –> 2 channels	
A085-061	Upgrade NP2.1/E; 1 –> 4 channels	
A085-062	Upgrade NP2.1/E; 1 –> 8 channels	
A085-063	Upgrade NP2.1/E; 1 –> 3 channels	
A085-071	Upgrade NP2.1; 1 –> 4 channels	

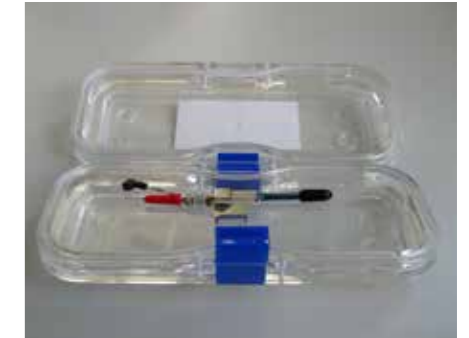| Article Number	Description	Figure
	Packaging Material	
A076-002	Crate with spring clips for NP2, complete	●
A076-003	Foam pads for NP2.1 crate	●
A076-004	Foam pads for NP2.1/E crate	●
A076-011	Packaging for 8-channel dilutor	●
A076-012	Packaging for 4-channel dilutor	(●)
A076-042	Crate with spring clips for NP2/E, complete	●
A076-044	Packaging for slide deck, NP2/E	
A076-203	Membrane box 1605, for piezo dispensers	
A076-204	Membrane box 147, for piezo dispensers	●
A076-205	Membrane box 45, for piezo dispensers	●

A076-042   *Crate with lid and spring clips (completely demountable) for NP 2.1/E (A076-002 smaller)*

More Nano-Plotter spare parts on request

For more information contact:

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GESIM