

Frequently Asked Questions

Dimatix Materials Printer and Cartridge

1. What types of fluids can the Dimatix Materials Printer (DMP) jet?
It is possible to jet a wide variety of fluids with the DMP, including aqueous-based, solvent-based, UV-curable fluids, biological solutions and particle suspensions.
2. What are the ideal fluid properties and characteristics that can be jetted by the DMP?
Ideal fluid properties and characteristics are viscosity 10-12 cps, surface tension 28-30 dynes/cm, sub-micron particle size, homogeneous, Newtonian, neutral pH and thermally stable without particle settling or aggregation.
3. What fluids and materials are chemically compatible with the cartridge?
Aliphatic hydrocarbons (e.g. hexane, dodecane),
Aromatic hydrocarbons (e.g. anisole, trimethylbenzene),
Aliphatic alcohols (higher boiling points are more compatible),
Ketones, Ethers, Acrylates, Glycols (e.g. polyethylene and polypropylene glycols),
Lactate esters and Cellusolves
4. What is the cartridge composed of, and what materials will come in contact with my fluid?
Silicon, silicon dioxide, & chemically-resistant epoxy, plus:
For DMC-11610/DMC-11601: Polypropylene, peroxide treated EPDM
For DMCLCP-11610/DMCLCP-11601: Kalrez[®], LCP (Liquid Crystal Polymer)
Not available after August 30, 2019. New cartridge products to be available in 2020. Contact Fujifilm Dimatix for more information.
5. What is the maximum/minimum volume that can be used in a cartridge?
The maximum volume a cartridge can hold is 1.5 mL. The minimum volume that can be used is about 0.2 mL. Under-filling with less than 0.2 mL will not allow jet priming.
6. How much can I print with a cartridge?
Excluding a small amount of fluid used in priming the printhead, 1 mL will provide 1×10^8 , ten picoliter drops.

7. What is the storage life of the DMP cartridge?

The storage life of the cartridge depends on the storage life of the fluid used, and how the fluid interacts with the printhead/reservoir.

8. What is the maximum jetting frequency that can be used to print?

The maximum jetting frequency that can be used to print is 15 kHz.

9. What is the maximum/minimum temperature range that can be used to jet fluids?

The DMP cartridge printhead has a built-in heater and can be used to jet fluids up to 60°C. The fluid reservoir is not heated and the cartridge does not have built-in cooling mechanism.

10. Is it possible to print with less than the number of printhead nozzles available?

You can print with a contiguous range of jets or with just a single nozzle.

11. What is the DPI resolution of the printer?

The printer resolution can support up to 5080 DPI. Other resolutions are achieved by changing the cartridge angle. Since the nozzles are in a single row, the cartridge can be set to various angles to adjust the effective spacing of the nozzles for printing. This feature enables the user to set the resolution according to the spot size of the fluid on the substrate (drop spacing).

12. How can I create a pattern to print? What file format will the printer accept?

You can make patterns using the default pattern generator provided with the DMP which will be a proprietary format. You can also use other graphics software to create monochrome bitmap files (1-bit BMP) which is the only other file format the DMP will accept. If your file format is DXF, Gerber, GDSII or OASIS, then you will first need to convert them to 1-bit BMP files.

13. What drop placement accuracy can be achieved if I replace cartridges and want to jet a drop on a location that I already jetted on?

The system repeatability is ± 25 microns. To get the best accuracy you must use the DMP with the Fiducial Camera option, which will allow you to calibrate the position of the nozzle in your new cartridge and align to a spot that was previously deposited.

14. What is the drop size repeatability and accuracy?

Drop size repeatability is within 3.5 % and about 0.5 % after optimizing jetting parameters.

15. What is the smallest/largest size spot or line that can be printed?

Spot size (and line widths) are dependent on the fluid and substrate interaction. Generally, a 40-50 μm spot can be produced with a 10 pL drop, while a 1 pL drop can create a 20-30 μm spot size.

16. What is the largest drop size that can be jetted?

The drop volume of a 10 pL cartridge can be increased by modifying the waveform to include multiple pulses, where each pulse is an additional 10 pL. Eight-pulse jetting can be achieved with the Dimatix Model Fluid which produces ~ 80 picoliter drop.

17. What is the maximum substrate size and thickness that can be printed on?

You can print on a substrate up to an 8.5" x 11" (A4) size and a thickness of up to 1" (25 mm). The maximum distance the printhead carriage (Z-axis) can move up to is 25 mm.

18. Is there a minimum substrate size?

There are vacuum holes on the platen to hold substrates in place. Since the holes are 50 mm x 50 mm apart, you can print on a substrate slightly larger than that to hold it down with vacuum. With small substrates, most of the platen's vacuum holes will be open so you will need to cover them and tape the substrate down (or use a fixture).

19. What types of substrates can be printed on?

Virtually any flat surface can be printed on, including plastic, glass, ceramics, and silicon, as well as flexible substrates from membranes, gels, and thin films to paper products.

20. Can the substrate be heated?

The substrate stage (platen) can be used at room temperature or heated up to 60°C.

21. How accurate are the temperature settings for the cartridge and platen?

Cartridge temperature variability is $\pm 1^\circ\text{C}$, and the platen temperature uniformity is $\pm 2^\circ\text{C}$.

22. Does the DMP have an IR and/or photocuring capability?

No, currently the DMP does not have either of this capability. If you require to thermally cure your fluid, you would first have to print the image then remove the printed substrate and place it in an oven for the desired time and temperature.

23. Does the DMP have UV curing capability?

No, however some third-party manufacturers provide a UV lamp accessory kit and can help provide guidance on how to use it safely and effectively.

24. Can the printer utilize existing fiducial marks on my substrate? Can the printer align substrates that were placed inaccurately on the platen?

Called 'theta calibration,' the fiducial camera and platen work together to allow you to compensate for any angular offset that you might have when placing a substrate on the platen. The calibration allows for alignment along the X-axis, and provides accurate substrate position.

25. Is it possible to watch the printed line with the fiducial camera while printing (live viewing)?

No, the fiducial camera is not positioned to view the print as they are deposited.

26. What is the magnification and resolution of the drop watcher?

On a 19" display, the Drop Watcher camera image is about 210 mm x 170 mm on the screen. This image area represents an actual area of about 1.4 mm x 1.1 mm on the cartridge. This magnification is 150x. The resolution as displayed on the monitor is about 2.25 microns per pixel.

27. What print parameters does the Drop Manager software allow control of? Is it possible for user-defined print jobs/sequences/scripts/macros?

The software allows you to generate print patterns and fully adjust all printhead drive parameters as well as establish automatic cartridge cleaning cycles and other functions. However, it is not possible at the moment to have user-defined macros/scripts.

28. What is the file format that drop watcher images are saved?

Still images are saved as bitmap or *.bmp files and video images are saved as *.avi files.

29. Can the printer be operated in a glove box-type environment?

Depending on the fluid type, you may get excessive evaporation at the nozzles and cause jetting problems due to 0% relative humidity.

30. What is the maximum pressure that the cartridge fluid system is subjected to when purging?

The maximum preset value for purge pressure is 5 psi (nonadjustable).

31. Can a negative back pressure be used to unblock nozzles?

No. Although the DMP has negative pressure capability to maintain the fluid meniscus in the jetting device, it cannot generate enough negative pressure to unclog nozzles. Often, a normal purge cycle is enough to help clear jets.

32. What kind of working table is recommended for reducing printer vibration? Does the printer vibrate when printing?

The printer does not vibrate significantly while printing, but it should be placed on a strong table.

33. Is there a required maintenance schedule or preventive measures to keep the DMP in good operation?

Good maintenance practice must be followed when installing new cartridges, inspection of print area, proper greasing, and keeping encoder strips clean and free of obstruction.