

## Detailed Specifications

| Subsystem            | Item   | jetlab II   |
|----------------------|--|---|
| Motion               | Substrate Size   | 200 × 200 mm<br>300 x 300 mm (xl-300 version)<br>Option: custom                                       |
|                      | X Stage Travel   | 300 mm  |
|                      | Y Stage Travel   | 200 mm<br>300 mm (xl version)   |
|                      | Z Stage Travel   | 40 mm   |
|                      | X, Y Encoder Resolution  | 0.1 um  |
|                      | Positioning Accuracy   | ±15 um<br>Option: ±3 um with mapping  |
|                      | Positioning Repeatability  | ±5 um<br>Option: ±1 um with mapping   |
|                      | X & Y Stage Travel Speed   | 100 mm/s  |
|                      | X & Y Stage Acceleration   | 400 mm/s <sup>2</sup>   |
|                      | X & Y Stage Payload, maximum                                       | 20 kg   |
|                      | Z Stage Travel Speed   | manual; option 10 mm/s  |
|                      | Z Stage Payload (printhead), maximum                               | 5 kg at 75 mm from carriage   |
|                      | Theta Stage  | Optional configurations: stent, tissue scaffold, and array printhead                                  |
| Material Load/Unload | manual   |   |
| Vision               | Downward-looking Camera  | For alignment to fiducials and inspection of printed features, includes through-the-lens illumination |
|                      | Alignment Method   | Program-assisted manual<br>Option: teach/semiautomatic  |
|                      | Post-printing Visual Inspection                                    | Option: manual survey   |
|                      | Jet Set-up & Observation Camera                                    | Manual; option: semiautomatic measurement / monitoring (available 07)                                 |
|                      | Jet Set-up Method  | Manual; option semiautomatic measurement / monitoring (available 07)                                  |
|                      | Synchronized Strobe  | standard  |
|                      | Field of View (horizontal and vertical)                            | 4 mm x 3 mm (typical)   |
| Thermal & Pneumatic  | Pneumatics Control Circuit   | three state pneumatic control   |
|                      | Operating Pressure Control   | vacuum / pressure fine adjust to 2 mbar<br>Option: digital control                                    |
|                      | Pressure Gages   | digital   |
|                      | Number of Pressure Outputs (includes control and display for each) | 1<br>Option up to 4   |
|                      | Pneumatic Control Method   | Manual: option automated  |
|                      | Pressure Input   | 60 psig [420 kPa]<br>20 scfm [2 scmm]   |
|                      | Vacuum Input   | below -20 in Hg   |
|                      | Temperature Controllers  | Option: 1-4   |

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|--------------------------------------|---|--|
| Mechanical, Electrical & Environ.    | Work Surface  | honeycomb with threaded holes  |
|                                      | Workpiece holder  | User specified: options include heated vacuum platen, fixtures for: microscope slides, MALDI plates, microtitre plates ...   |
|                                      | Vibration Isolated Work Surface                           | elastomeric feet   |
|                                      | Enclosed Work Area  | standard   |
|                                      | HEPA Filters Overhead                                     | Option   |
|                                      | HEPA Blower Unit  | Option   |
|                                      | Solvent Ventilation                                       | Optional duct connection   |
|                                      | Footprint   | 44"x28" [112 cm x 71 cm] tabletop<br>48"x32" [120 cm x 75 cm] floor  |
|                                      | Safety  | CE approved in 07  |
|                                      | Power   | 220-240V, 6A, 50-60Hz<br>Option: 120V, 6A, 50-60Hz   |
|                                      | Clean Room Compatibility                                  | no   |
| Printing Control & Drive Electronics | Stationary Printhead                                      | standard   |
|                                      | Motorized Z-Axis Control of Print Head                    | standard   |
|                                      | Point-to-Point Operation                                  | standard   |
|                                      | Print-on-the-Fly Operation                                | standard, printing at any angle allowed (i.e. both stages moving)  |
|                                      | Jet Drive Electronics                                     | JetDrive III: bipolar and arb mode<br>Option: multi-channel JetDrive III-(n)   |
|                                      | Drive Electronics Multiplexer                             | integrated   |
|                                      | TTL control signals                                       | 8 outputs - # of multiplexed jets on/off and timed   |
|                                      | Jet On-Line / Off-Line Selection                          | through user interface, scripts  |
| Print Pattern                        | Operating Frequency                                       | up to 30 kHz   |
|                                      | Built in Patterns   | line, rectangular border, array, array-of-arrays (arbitrary angle)   |
|                                      | Rotation Correction                                       | standard   |
|                                      | Multiple Fluid Control                                    | standard   |
|                                      | Print Pattern Import                                      | GDS II converter; monochrome BMP   |
| Complex Print Jobs                   |   | script file: nesting, repetition with offsets, wait states, maintenance, & TTL controls  |
|                                      |   |  |
| Printheads                           | Select one or more options (see Printhead Specifications) | Solder Jet Printhead Subsystem   |
|                                      |   | Polymer Jet Printhead Subsystem  |
|                                      |   | 1 Single Channel Printhead   |
| Jetting Devices                      | Select one or more options                                | High Temperature Device  |
|                                      |   | Low Temperature Devices  |
|                                      |   | Integrated Array: 10 jets, 10 fluid inputs   |
|                                      |   | Integrated Array: 16 jets, 1 fluid input   |
| Control system                       | Computing hardware  | PC104+ based, 733 MHz Celeron M, 512 MB RAM, 8 MB shared VRAM, 40+ GB HD, CD-ROM, Ethernet port, USB 2.0 port; keyboard, monitor, mouse.   |
|                                      | Operating system  | Microsoft Windows XP SP3   |
|                                      | Machine control program                                   | Integrated control program for (multiple) jet setup and selection, positioning calibrations, pattern printing and surveying, TTL-controllable auxiliary equipment, depending on and supporting all hardware and software options on all jetlab models. |