

## NOVA Platform (1.0)

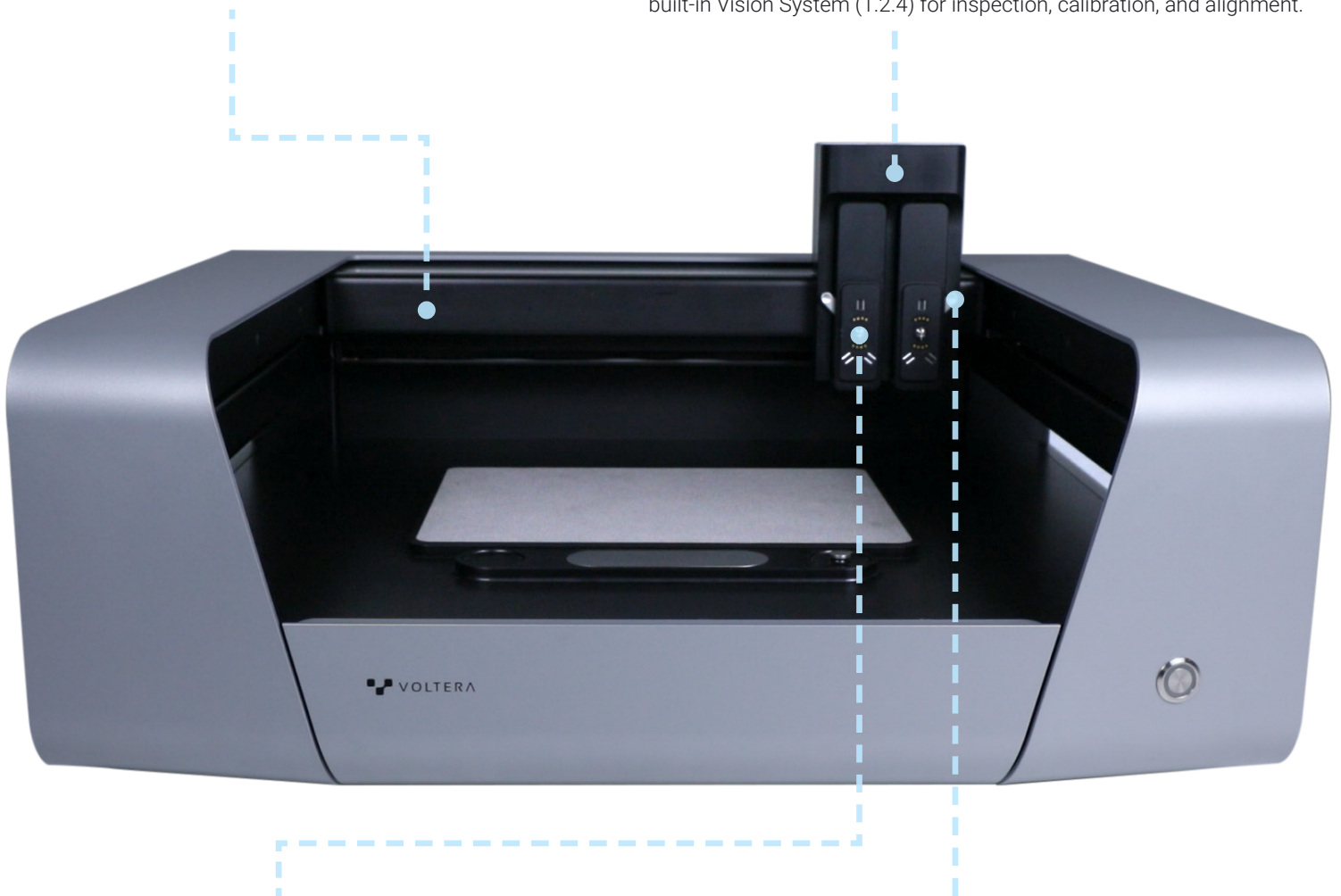
This is the base NOVA system. It contains an onboard computer which handles communication and connectivity over wifi or ethernet, allowing the user to control NOVA through NOVA's Web App. It also relies on an NVIDIA graphics module for image processing with machine learning capabilities. It is configured as a gantry, referring to the 3-axis positioning system (X/Y/Z). RGB Status LEDs communicate the state of the base system, with ports for power and peripherals accessible on the right side of the unit with USB2.0, USB3.0, and ethernet.

### BRIDGE (1.1)

This crossbar forms the X-axis of the NOVA Platform (1.0), connecting to the y-axis on either side. It connects to the Module Hub (1.2), and handles mobility and stability in XY.

### MODULE HUB (1.2)

This part is the communications interface for Voltera NOVA's modules. This also handles z-axis motion, independently controlling each Module Port (1.2.1) to precisely position the tools. This also includes a built-in Vision System (1.2.4) for inspection, calibration, and alignment.



### MODULE PORT (1.2.1)

The part contains the gantry side implementation of NOVA's MODULAR TOOL INTERFACE - Voltera's interface for connecting a module / tool - for example, the Smart Dispenser (2.0), the Precision Touch Probe (3.0), or future attachments - to NOVA.

### LOCKING LEVER (1.2.2)

This lever is connected to the locking bar on the Module Port (1.2.1). Pushing the lever down locks the tools/modules in place and activates the Hub-Side Interface (1.2.3), allowing NOVA to connect to and identify tools. This provides a safe interface to power, which will not be supplied until the lever is engaged.



### HUB-SIDE INTERFACE (1.2.3)

On the NOVA Platform (1.0) side, NOVA's MODULAR TOOL INTERFACE consists of mechanical features to guide the tool onto the Module Port (1.2.1) (kinematic coupling), a locking mechanism connected to the Locking Lever (1.2.2) to secure the module / tool in place, and electrical contact points to supply the tool with power and 2-way communication with the NOVA Platform (1.0)

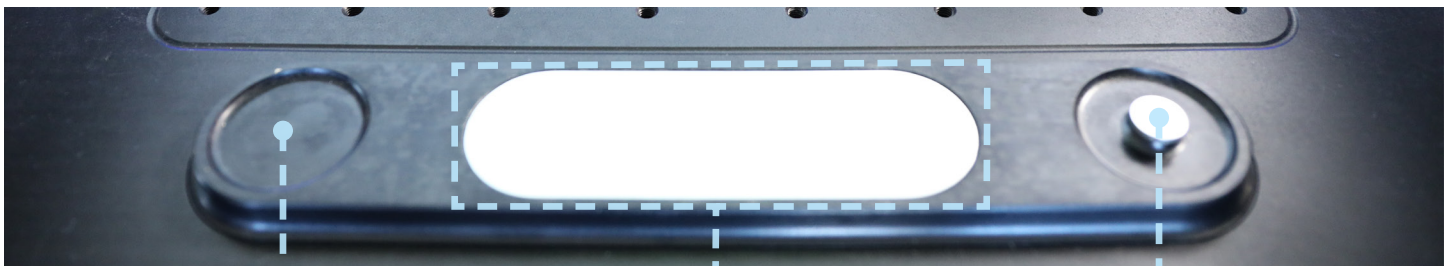
### VISION SYSTEM (1.2.4)

This contains an autofocus camera integrated directly into the system. With resolution down to 17um/pixel, this system brings high-end inspection, alignment and measurement capabilities to your benchtop: measuring the width of a trace, projecting your pattern onto the substrate with an AR overlay, and precisely aligning your printed traces with features on your substrate. An RGB LED array provides uniform lighting and contrast.



### CALIBRATION AREA (1.3)

This area is located at the front of the base system, closest to the user. It handles the interactions required for locating and calibrating NOVA's tools and modules. On this area, you can find the XYZ Positioning System (1.3.3) for measuring precise tool position in space, the Calibration Plate (1.3.2) for testing your dispensing flow rate and materials calibration without printing directly on the substrate, and the Drip Tray (1.3.1) for priming the nozzle and estimating pressure for new materials.



### DRIP TRAY (1.3.1)

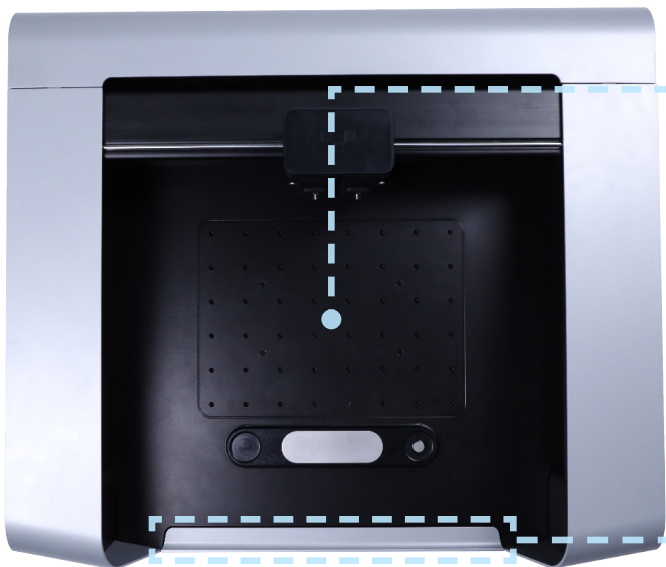
This area is a recess for ink to drip during pressure estimation, and provides NOVA a convenient rest location between prints.

### CALIBRATION PLATE (1.3.2)

This part is a simple removable stainless steel plate that saves a lot of headache. By testing your print performance on this instead of printing on your substrate, there's no need to risk damaging a sensitive coating or reserve space on an already-cramped design.

### XYZ POSITIONING SYSTEM (1.3.3)

This part consists of a flat, round surface that protrudes from the Calibration Area (1.3). Internally, this is very similar to the Precision Touch Probe (3.0), with the ability to switch between Z mode and XY mode for precise measurement of any tool position with micrometer resolution. Working together with the Vision System (1.2.4) and the Precision Touch Probe (3.0), this is a key component of NOVA's exceptional positional accuracy.



## MOUNTING GRID (1.5)

This part is a modular print area for any substrate mounting requirement. It includes M5 mounting holes in a 40mm grid, extending up to A4 in size for custom fixturing, and also accepts the Vacuum Module (4.0) for securing flexible substrates like PET or Kapton.

## ACCESSORY DRAWER (1.4)

This part is a convenient location for storing your tools, modules, and accessories together with your NOVA. Damped rails ensure a safe and smooth close every time.



## PORTS (1.6)

This is located on the back right side of the NOVA Platform (1.0). Here, you can find the device sticker including device name, serial number and regulatory information, as well as a USB 2.0 port, USB 3.0 port, ethernet port, and power port.

# Smart Dispenser (2.0)

This module is a sophisticated self-contained dispensing system for pastes and inks with real-time pressure based feedback control, carefully monitored through the Dispenser's onboard computer and sophisticated pressure sensor. The Dispenser can accept 5cc cartridges filled with your desired material, and consists of the Actuator (2.1), the Dispenser Body (2.2), the Pressure Sensor (2.3) - a proprietary quick-swap fluid channel for easy material changeover without purging lines- and a heating system, ensuring that your material is consistently printed regardless of the ambient environment.



## ACTUATOR OVERRIDE DIAL (2.1.1)

This part allows you to manually extend and retract the Plunger (2.1.2) when it is not being controlled by the Actuator (2.1).

## ACTUATOR (2.1)

This part contains the mechanical components required to transfer force to the fluid in the cartridge and initiate dispensing. It can create up to 80PSI of dispensing pressure, allowing you to print even high-viscosity materials with the correct nozzle, or create a negative pressure to prevent any dripping or material leakage.

## DISPENSER BODY (2.2)

This part contains the brains and sensing elements required to precisely dispense all manner of materials by measuring the fluid pressure in the Pressure Sensor (2.3). The onboard microcontroller handles the necessary computation for accurate dosing, as well as communicating with NOVA through Module-Side Interface (2.2.5).

## PLUNGER (2.1.2)

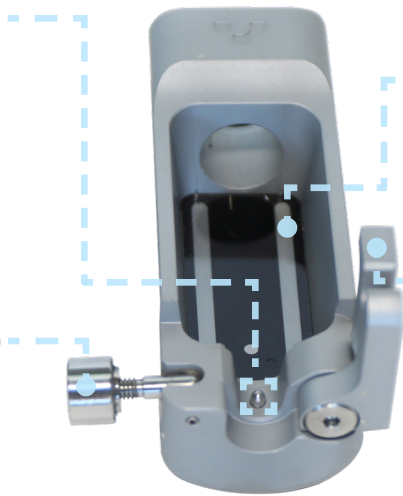
This part extends to apply force to the fluid in the cartridge, or retracts to relieve pressure. The o-ring on the part allows it to create a negative pressure on retract, preventing any leakage or dripping during dispensing altogether.

## PRESSURE COUPLING PIN (2.2.4)

This transfers pressure from the Pressure Sensor (2.3) to the Dispenser Body (2.2), allowing the Smart Dispenser (2.0) to monitor the fluid pressure directly at the nozzle, all without contacting the fluid itself or exposing it to atmosphere.

## DISPENSER DOOR LOCK (2.2.1)

This part secures the Dispenser Door (2.2.2), locking the Pressure Sensor (2.3) in place for the duration of printing.



## STATUS INDICATOR LEDS (2.2.3)

These lights communicate the module status.

## DISPENSER DOOR (2.2.2)

This part can be opened to access the Pressure Sensor (2.3), allowing you to quickly and easily swap your materials with no cleaning or purging required.

## PRESSURE SENSOR (2.3)

Using an elastomer window that contacts the fluid inside, the Smart Dispenser (2.0) senses pressure, in real-time, directly at the nozzle without contacting the fluid or exposing it to the atmosphere. It can be easily removed for material changeover and cleaned with a simple brush. Its non-reactive metal hub and fluoropolymer membrane make it effectively inert, giving you complete freedom over your materials formulation.



## PRESSURE SENSING MEMBRANE (2.3.1)

This consists of a flexible, inert fluoropolymer to transmit fluid force to the Pressure Coupling Pin (2.2.4).

## NOZZLE LOCK (2.3.2)

This twists to secure luer lock nozzles onto the Pressure Sensor (2.3).

## Precision Touch Probe (3.0)

This module contains a solid-state touch sensor for surface mapping of substrates. It features a ruby-tipped stylus, an industry standard for precision contact measurements in 3 axes. Voltera's custom sensing and control electronics allow for 0-strain contact measurement, ensuring that NOVA can map surfaces with micro-step resolution.



## STATUS INDICATOR LEDS (3.1)

These lights communicate the module status.

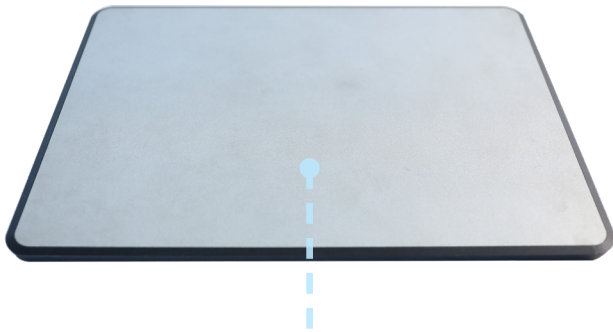
## PROBE STYLUS (3.2)

This ruby-tipped stylus connects directly to the control and sensing electronics to immediately detect contact with a surface.

## MODULE-SIDE INTERFACE (2.2.5 & 3.3)

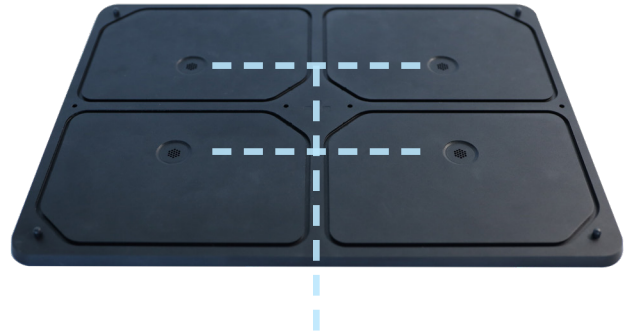
This is the implementation of NOVA's MODULAR TOOL INTERFACE on the tools / modules. It consists of the female counterpart to the locking bar, ball bearings for kinematic coupling, and pogo pins to contact the communication and power pins on the gantry-side interface.





### VACUUM MODULE (4.0)

This module is a drop-in vacuum table for securing flexible or soft substrates to NOVA. It contains a porous titanium surface, allowing uniform air flow throughout to evenly secure any substrate at all points. The back side of the module features four vacuum ports which connect to a vacuum manifold inside.

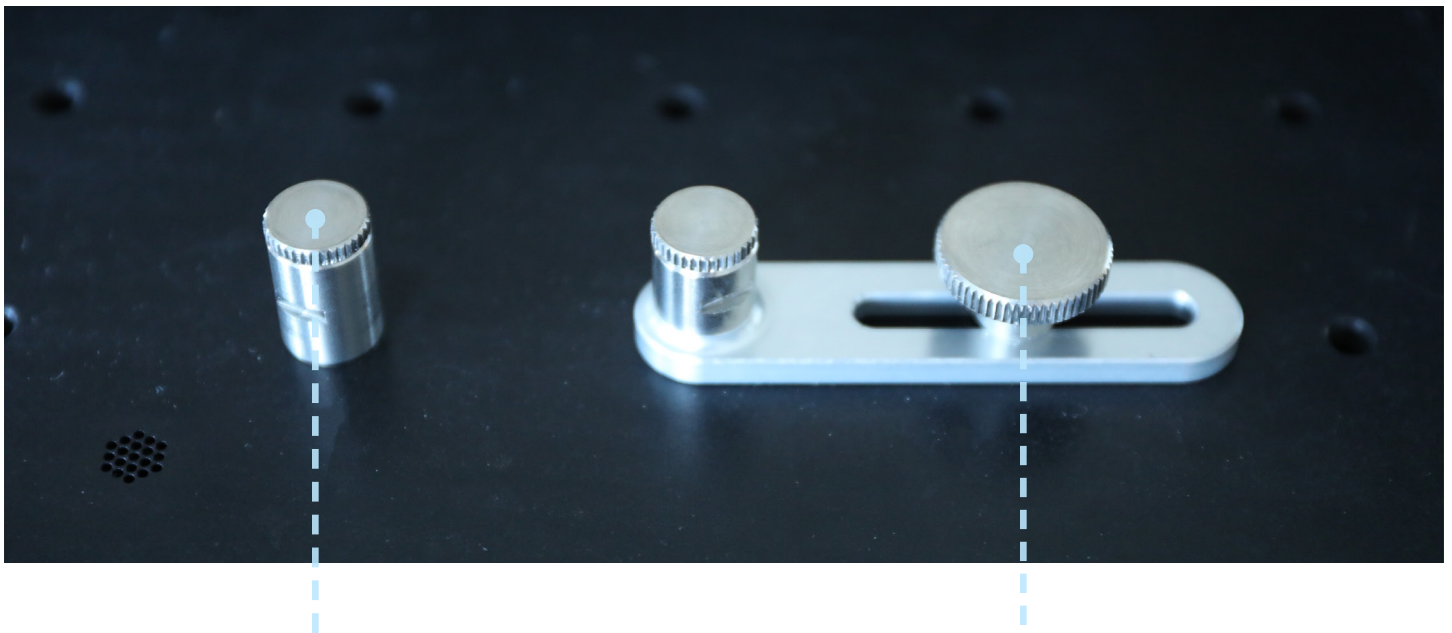


### VACUUM PORTS (4.1)

Non-Descript

## MOUNTING ACCESSORIES (5.0)

These accessories screw directly into the Mounting Grid (1.5), allowing you to quickly mount and adjust a rigid substrate for printing. With a total standoff clearance of XX mm, both sides of your substrate are clear of any obstruction - for example, allowing you to print or inspect even when there are components mounted on your board.

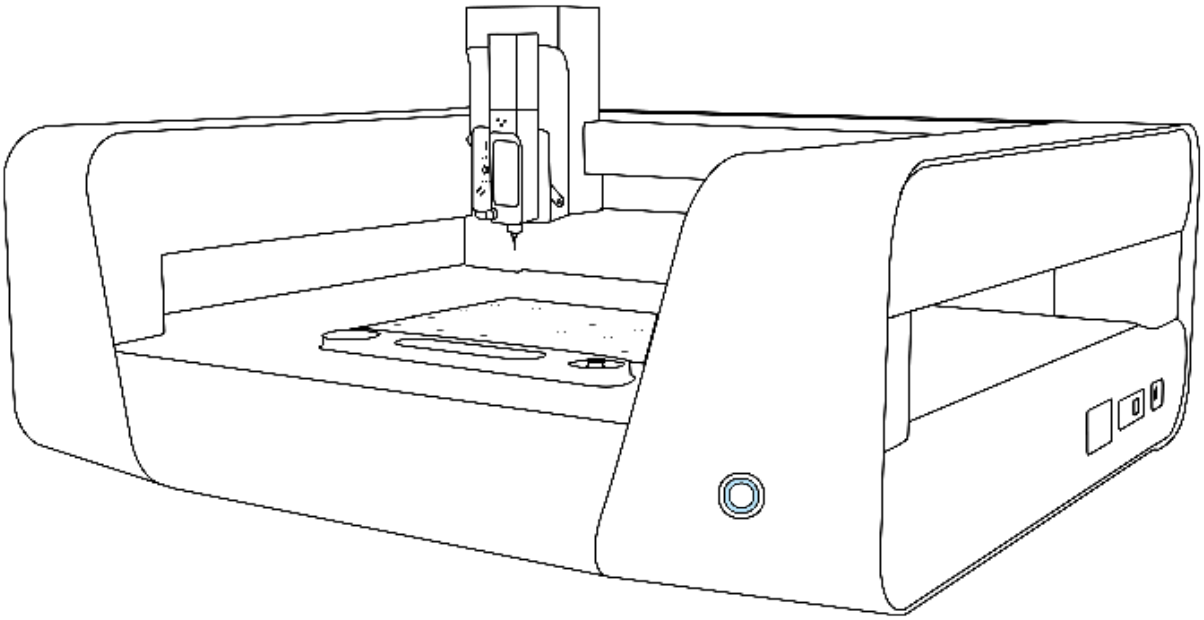


### ANCHOR MOUNT (5.2)

This component screws right into the Mounting Grid (1.5) to provide a rigid support for your substrate. With a thumbscrew, you can use these to anchor fixed points of your substrate, to then secure with the Sliding Mounts (5.1.1).

### SLIDING MOUNT (5.1)

This component can be repositioned, extended, or rotated in place by simply loosening a thumbscrew.



 VOLTERA NOVA