**Lab Series**

**High Cost Performance Series**

**Standard Model**

**ElevenLab**
- Spindle Speed: 41,000rpm
- Single Step Tool Change
- Standard Equipped Camera Monitoring System
- Cabinet (option)

**ElevenLab 60**
- Spindle Speed: 60,000rpm
- Single Step Tool Change
- Standard Equipped Camera Monitoring System
- Cabinet (option)

**Working area**
- 229x320mm

**Easy Operation!**
- Single Step Tool Change
- Tool change can be done without any complicated action such as thread fastening.

**Auto Tool Change Model**

**AutoLab**
- Spindle speed 62,000rpm
- 10 Auto Tool Change
- Standard Equipped Camera Monitoring System
- Cabinet (option)

**AutoLab 100**
- Spindle speed 100,000rpm
- 10 Auto Tool Change
- Standard Equipped Camera Monitoring System
- Cabinet (option)

**Working area**
- 229x300mm

**AutoLab W**
- Spindle speed 62,000rpm
- 10 Auto Tool Change (20 by option)
- Standard Equipped Camera Monitoring System

**Working area**
- 400x365mm

**Our PCB prototyping systems enable easy & high precision board making**
- Ideal for in-house prototyping
- Time saving of product development
- Produces boards with the precision expected in a laboratory
- Processing without chemicals
FP-21T Series
High Precision Performance Series

FP-21T Most popular
Desktop type with 3-axes control system
3 models which have different Spindle speed: 40/U, 60, and 100. Air-floatation and non-contact pressure foot for 21THP. Ideal system for High-Frequency Circuit, Teflon Board, Flexible Films.

Capable of processing various materials besides substrate boards. Hardware parts, panel engraving, supplementary work on finished board, and other works done with MITS prototyping machine are shown below. With your unique ideas, applications for FP-21T/21THP are limitless.

Double-sided board
Aluminum
Acrylic
Characters on a panel
Supplementary processing
Parts made of duracon
LED light
Speaker cover
Puzzle pieces

50µm(2mil) line and space, the state of the art!

FP-21T Precision
• High performance spindle motor
• Standard Equipped Camera Monitoring System
• Cabinet (option)

Stepping method (three dimensional regulation) and non-contacting pressure foot (HP type) lead to the fine processing technology.

This model features construction for high-rigidity and low center of gravity as well as a spindle motor with minimum level of runout, to ensure very low vibration making it ideal for the finest level of processing.

With our innovative Z-axis control (stepping method), the FP-21T Precision takes the advantages of the fine and fragile tools, and is capable of processing 50 m(2 mil) lines and spacing for the first time in the world as a desktop PCB prototyping machine.

In comparison to the laser machine, FP-21T Precision is far superior in sharp cutting edge and cost performance.

Standard Equipped Camera Monitoring System
Cabinet (option)

Silicon wafer

50µm Line & Space PCB Board
Comparing with mechanical pencil lead width.

Working area 150x150 mm
50µm space
50µm line
Silicon wafer

Working area 350x250 mm
(magnified 1,050 times)
Providing very beautiful fine and accuracy cutting finish on the prototype PCB is most required point for the PCB Prototyping Machine.

Wide range of product line-up
In order to meet the increasing demand for miniaturization and high-density of PCBs in many fields of electronics, MITS is offering wide range of PCB prototyping machines including FP-21T Precision, the world first 50 μm (2 mil) line/spacing milling machine, and many other machines for various purposes.

Made-in-Japan machines, renowned for quality and reliability
MITS has been enjoying high reputation as the leading Japanese manufacturer of PCB prototyping machines, offering the enduring, high-rigidity, and extraordinarily precise machines for many years.
All the manufacturing process of MITS machines is taking place in Japan, from design to construction. Thorough performance testing (by our own technical staff) ensures MITS prototyping systems to achieve fine-pattern processing.

Seamless integration from CAD designing to board making
You can produce your boards by importing your CAD data (Gerber or DXF output format) to our software enabling smooth process from CAD designing to board making.
Moreover, together with MITS original software suites and options, you will have even more useful and enhanced integrated MITS PCB prototyping systems.

You can produce single, double sided, multilayer, and high-density boards rapidly!
MITS PCB prototyping machine can mill various types of the boards from normal circuit boards to extremely thin circuit boards. Besides PCBs, MITS PCB prototyping machine achieve the fine processing on the surface of other materials such as aluminum or acrylic.

Options enable you to process even more precisely

**Fiducial positioning camera** (Standard equipment)
Board surface can be displayed 30,60 times magnified
Simply by equipping the color microscope with the machine and by connecting to the PC via USB, you can display the surface of the substrate board with 30,60 times magnification. Marking indicator and measurement function make it possible to align with high-precision and to measure the width of track/pattern.

**Vacuum table** (option)
- **Precise model VTP-CRM**
  Precise vacuum table made of the ceramics. Suitable for the material whose thickness is as thin as 50μm (2 mil).
- **Standard model VT-ABS**
  Vacuum table made of the plastic resin. Suitable for the material thicker than 200μm (8 mil).

**Surface detecting Device** (option)
Surface detecting device measures the thickness of the PCB.

**Non-contact Milling Head** (option)
As the head presses the board without direct contact by air floating, it leaves no undesirable traces on the board surface. Suitable for milling thin substrate boards and soft substrate boards such as teflon circuit boards.
* Required for air compressor

**Tool protrusion equipment** (option)
You can measure the protrusion length of the tool from the pressure foot by the micro meter.

**Specification**

<table>
<thead>
<tr>
<th>Specification</th>
<th>VTP-CRM</th>
<th>VTP-ABS</th>
<th>VT-ABS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Working area WxD (mm)</td>
<td>150x120</td>
<td>300x170</td>
<td>280x215</td>
</tr>
<tr>
<td></td>
<td>(5.9”x4.7”)</td>
<td>(11.8”x6.7”)</td>
<td>(11.0”x8.5”)</td>
</tr>
<tr>
<td>The minimum thickness</td>
<td>50μm (2 mil)</td>
<td>200μm (8 mil)</td>
<td>200μm (8 mil)</td>
</tr>
<tr>
<td>Porous surface material</td>
<td>Ceramics</td>
<td>Plastic resin</td>
<td>Plastic resin</td>
</tr>
<tr>
<td>Applicable model</td>
<td>FP-21T Precision</td>
<td>FP-21T</td>
<td>Lab series</td>
</tr>
</tbody>
</table>

**Result of Surface Detect**

- Minimum measuring quantity: 0.001mm (0.04 mil)
- Maximum measuring quantity: 0.140mm (5.5 mil)
- Dimension W x D x H (mm): 115 x 58 x 25 (4.1” x 2.3” x 1.0”)

(5)
### Specifications

<table>
<thead>
<tr>
<th>Model</th>
<th>Eleven Lab</th>
<th>Eleven Lab 60</th>
<th>Auto Lab</th>
<th>Auto Lab 100</th>
</tr>
</thead>
<tbody>
<tr>
<td>Working area (XY/Z) (mm)</td>
<td>229 x 320 x 10 *6 (30 *5) 9.0&quot; x 12.6&quot; x 0.4&quot;</td>
<td>229 x 320 x 10 *6 (9.0&quot; x 12.6&quot; x 0.4&quot;)</td>
<td>229 x 300 x 45 *6 (9.0&quot; x 11.8&quot; x 1.8&quot;)</td>
<td></td>
</tr>
<tr>
<td>Table size (mm)</td>
<td>296 x 396 (11.6&quot; x 15.6&quot;)</td>
<td>296 x 396 (11.6&quot; x 15.6&quot;)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Minimum width Line &amp; Space (mm)</td>
<td>0.1 (4mil)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control axis</td>
<td>X, Y, Z</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control motor</td>
<td>Stepper Motor</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Resolution (μm)</td>
<td>*1 0.625 (0.0246 mil)</td>
<td>0.156 (0.00614 mil)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maximum Travel speed (mm/sec.)</td>
<td>*2 55 (2.17&quot;)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spindle speed (min⁻¹) // motor</td>
<td>5,000 - 41,000 DC Spindle</td>
<td>5,000 - 60,000 DC Spindle</td>
<td>5,000 - 62,000 DC brushless Spindle</td>
<td>5,000 - 100,000 HF Spindle *4</td>
</tr>
<tr>
<td>Drilling (mm)</td>
<td>0.2 - 3.175 (8 - 125mil)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maximum drilling cycles (drill/min.)</td>
<td>*3 55</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tool Change</td>
<td>Manual Single Step Tool Change</td>
<td>Automatic / 10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pressure foot (Board Press Method)</td>
<td>One point of foot (3point:option)</td>
<td>3point of foot</td>
<td>3point of foot</td>
<td></td>
</tr>
<tr>
<td>Camera System</td>
<td>Standard 30x</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Power consumption (VA)</td>
<td>150</td>
<td>200</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Machine dimensions WxDxH (mm)</td>
<td>435 x 575 x 430 (17.2&quot; x 23&quot; x 17&quot;)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Machine weight (kg)</td>
<td>Approx. 28 (62 lbs)</td>
<td>Approx. 34 (76 lbs)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Features</td>
<td>Low-priced Popular model</td>
<td>Auto-tool-change</td>
<td>High speed spindle motor Auto-tool-change</td>
<td></td>
</tr>
</tbody>
</table>

*1 The minimum traveling figures for ordering each 3 axis movement. They do not represent the accuracy of axis positioning.  
*2 Optimum speed for cutting depends on tool, material of board and so on.

### Tools and peripheral equipments

- **Cabinet (option)**
  - Protect of dust and Less noise.
  - Dimensions WxDxH (mm) 500x580x450
  - Weight 10kg

- **Applicable model:** Eleven Lab, Auto Lab, Auto Lab 100

### Types of Tools

- Milling bit (60° or 90°)
- Diamond milling bit (30 times more durable)
- HF milling bit 0.05mm - 0.5mm (2 - 20mil)
- Rubout bit
- Drilling bit 0.05 - 3.175mm (2 - 125mil)
- Routing bit 1.0, 1.5mm (39, 59 mil)
- Aluminum engraving cutter 0.8, 1.0, 2.0mm
### Specifications

<table>
<thead>
<tr>
<th>Models</th>
<th>Working area (X/Y/Z) (mm)</th>
<th>Table size (mm)</th>
<th>Minimum width Line &amp; Space (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>FP-21T</td>
<td>350x250x25 *7</td>
<td>400x365x45 *6</td>
<td>0.1 (4mil)</td>
</tr>
<tr>
<td>FP-21T Precision</td>
<td>150x150x25 *7</td>
<td>490x490 (19.3”x19.3”)</td>
<td>0.05 (50μm) (2mil)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Control axis</th>
<th>Manual Single Step Tool Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>X, Y, Z</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Control motor</th>
<th>Resolution (μm)</th>
<th>Maximum Travel speed (mm/sec.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 phase Stepper Motor</td>
<td>4 (0.16 mil)</td>
<td>60 (2.4”)</td>
</tr>
<tr>
<td>5 phase Stepper Motor</td>
<td>1 (0.04 mil)</td>
<td>80</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Minimum width Line &amp; Space (mm)</th>
<th>Spindle speed (min⁻¹)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.1 (4mil)</td>
<td>DC Spindle / Motor</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Maximum drilling cycles (drill/min.)</th>
<th>Drilling (mm)</th>
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<tbody>
<tr>
<td>400x365x45 *6</td>
<td>0.05 - 3.175 (8-125mil)</td>
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</tr>
</tbody>
</table>

### Features

**Precision ring-setter (manual)**

- You can attach or detach the ring to the tools.
- Standardize the depth of the tools for the auto tool change machine.
- Effective in adjusting to the material of varied thickness.
- Applicable for tools less than 0.1mm.

**Jetstream**

Super Cleaner "Jetstream" creates pollution-free quiet factory environment

- Collects 99.97% of milling particle debris as fine as 3microns, while 90% for average household vacuum cleaner. (MITS inhouse experiment data)
- Jetstream noise level is 57dB, while 70dB for average household vacuum cleaner.
- Linked with the milling machine and power supply is automatically turned on and off.
- Maximum suction pressure is 22,500pascals and the pressure level can be freely and automatically adjusted.
- Compact and lightweight. 255Wx360Dx310H mm. 12.5kg
- Power consumption 630VA.

Available spare parts

- Filter Bag (1 pack with 5 pieces)
- HEPA Filter (1 pack with 1 piece)
- Exchangeable Motor Brush (1 pack with 2 pieces)
Software

Design Pro Chart

- **Design Pro (Standard Accessory)**
  Design Pro contains Converter and CAD application. The function of Converter is editing PCB pattern data, and data import/export. And, CAM application is designed to control our PCB prototyping machines. (For drawing and editing PCB patterns, our software EASY CAD is available as an optional extra.)
  - **Converter**
    This application has functions to import Gerber Data (RS274D, RS274X), or DXF data, and automatically generate PCB milling data based on imported PCB pattern data.
  - **CAM**
    This application is designed to control and set up MITS PCB prototyping machines. The machine runs along the generated PCB milling data on Converter or Easy CAD, also manual operation command. Any required setup to run machine is set in this application.
  - **System Requirements**
    - OS: Windows 10/8/7/Vista/XP (SP2)

- **EASY CAD (option)**
  - By using this easy-to-operate software, you can easily draw the patterns exactly as you want.
  - Straight forward and Easy to use.
  - Popular for high-frequency patterns.
  - **Functions & Features**
    - **Pattern Creation**
      After setting the line width, land/pad width and hole diameter, create a pattern on screen.
    - **Pattern Drawing**
      Diagrams of points, straight lines, arcs and characters can be produced.
      You can draw patterns by inputting numerical values.
    - **Editing Function**
      Editing functions such as line extension, line cutting, beveling (rounded corner or 45° bevel), object repositioning, copying, deleting, offsetting and hatching are possible.

- **CAD Softwares of Other Companies**
  - Convertible file format
    - Gerber
    - GerberX (274X)
    - Excellon Drill output data
    - DXF
  - Compliant Softwares
    - CR-5000 (ZUKEN)
    - Protel (Altium Designer)
    - PADS
    - OrCAD
    - Win PCB
    - Eagle
    - Microwave Office
    - Auto CAD (Auto Desk)
    - CADLUS
    - Ansoft Designer
    - HFSS
    - PCBE Altium
    - Design Spark
    - Other

Specifications and product details are subject to change without notice.