

# Installation and Use Guide



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# 1. Introduction

Welcome to the **Dyna-Meter Installation and Use Guide**.

The **Dyna-Meter** is a high-voltage alternating-current (HV AC) measurement system developed with plasma artists, technicians, and scientists in mind. Built on designs by Steve Ward of [Ward Power Electronics](#), this tool includes an [HV AC probe](#) and a calibrated cable connected to a DSO-152 portable oscilloscope. It provides a low-cost, portable solution for measuring high-voltage alternating-current outputs typical in plasma applications and other high-voltage experiments.

As Steve Ward describes, *"A high voltage probe can be a valuable tool for the high voltage experimenter or plasma artist to measure the output of, for instance, an 'AC flyback' transformer."* By using a capacitive voltage divider, the Dyna-Meter probe allows users to measure alternating current signals within a frequency range of 5kHz to 500kHz with reasonable accuracy ( $\pm 5\%$ ). This means it won't measure DC or standard 50/60 Hz AC signals, but it's optimized for the high-frequency environments often encountered in plasma work.

## Safety Considerations

Working with high-voltage equipment comes with inherent risks. It's essential to follow proper safety protocols, as the Dyna-Meter operates with electrified components that can pose a risk of shock or fire if not handled correctly. Always ensure the probe is grounded to a grounded outlet for optimal operation and safety. A grounded setup not only protects the equipment but also ensures accurate measurements.

## Our Vision

The Dyna-Meter represents a breakthrough in understanding plasma light sculpture and the art of filling gases. By adding this tool to the plasma artist's toolkit, we hope to pave the way for further discoveries in how gas mixtures interact with transformers. We're excited to see what insights this tool will uncover, and we look forward to witnessing the advancements it enables in the field of plasma light art. Beyond developing gas mixes, the Dyna-Meter also doubles as a diagnostic tool for the drivers themselves — it has already helped in providing feedback during R&D for Amazing1 products.

## 2. Components and Package Contents

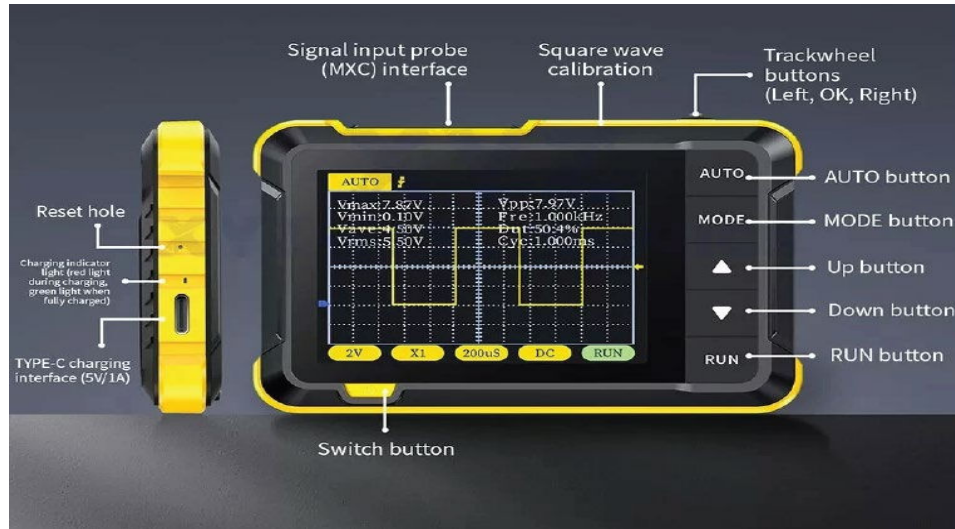


### Diagram of Components:

- A. Dyna-Meter Probe
  - 1. HV hook clip
  - 2. BNC female connector
  - 3. Grounding Plug
- B. MXC male to BNC Female Connector
- C. FNIRSI DSO152 Oscilloscope
- D. 6ft male-to-male RG9 BNC Cable
- E. USB to USB-C Cable
- F. FNIRSI DSO-152 User manual (not shown)



Scan to view the FNIRSI DSO-152 User Manual (PDF)



Details of DSO-152 Oscilloscope (FNIRSI Official Images)

### 3. Specifications

|                                  | FNIRSI DSO152 Pocket Oscilloscope                                                                                                                                                                               | DynaMeter Probe                                                                                                               |
|----------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------|
| <b>Voltage Range and Limits:</b> | <p><i>Max Input Voltage:</i></p> <p>400V (DC + AC Peak, 1x probe);</p> <p>40V (DC + AC Peak, 10x probe).</p> <p><i>Measurement Range:</i> <math>\pm 5V</math> (1x probe), <math>\pm 50V</math> (10x probe).</p> | <p><i>Max Input Voltage:</i> 20KV</p> <p><i>Measurement Range:</i> 1000v:1v</p> <p>*Must be grounded using grounding plug</p> |
| <b>Frequency Range:</b>          | <p><i>Bandwidth:</i> 200 kHz</p> <p><i>Sampling Rate:</i> 2.5MS/s</p>                                                                                                                                           | 5kHz to 500kHz                                                                                                                |

|                                        |                                                                                                                                                 |                                                                                                                               |
|----------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------|
| <b>Physical Specifications</b>         | <p><i>Dimensions:</i><br/>99 x 68.3 x 19.5 mm</p> <p><i>Weight:</i> 150 grams (approximate).</p> <p><i>Display:</i> 2.8" (320 x 240 pixels)</p> | <p><i>Dimensions:</i><br/>95.25 x 28.57 x 28.57 mm<br/>(3.75 x 1.125 x 1.125 in)</p> <p><i>Weight:</i> 158g (approximate)</p> |
| <b>Materials Used in Construction:</b> | ABS plastic housing, glass screen protector, PCB with copper traces.                                                                            | PETG Plastic, heat shrink, PCB with copper traces, Potting Resin                                                              |
| <b>Power Requirements:</b>             | Charged using 5V/1A USB-C charger (cable included)                                                                                              | N/A                                                                                                                           |

## 4. Installation Guide

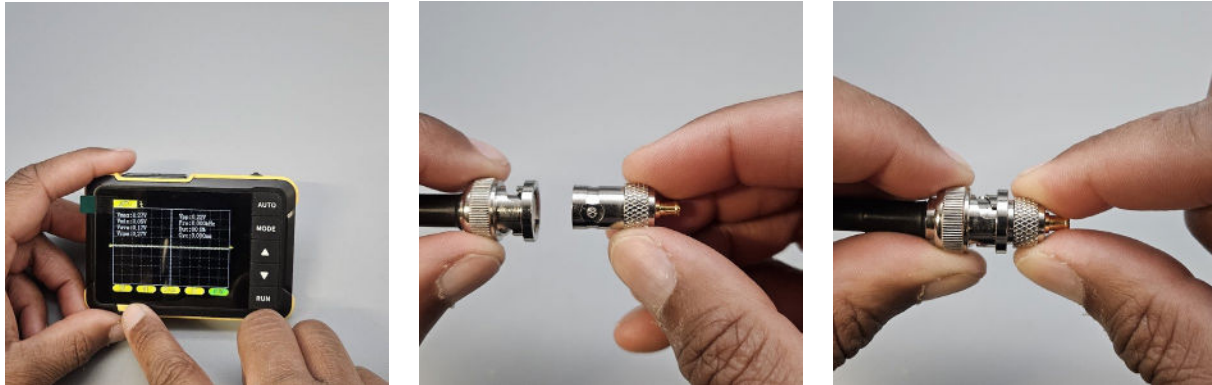
### Workspace Preparation

- Select a clean, dry, non-conductive work area away from flammable materials.
- Ensure proper ventilation if gases are involved.

### Initial Inspection

- Check all components for physical damage upon unpacking.
- Verify that all items in the package list are present.

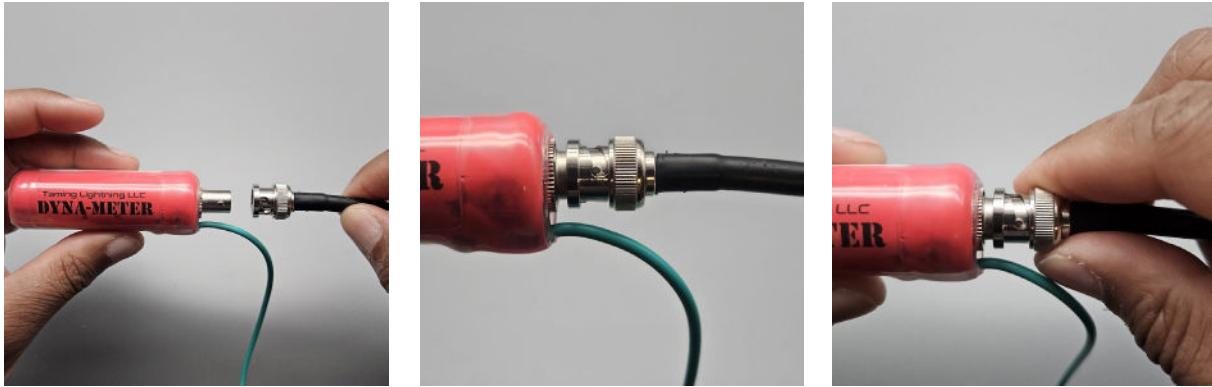
## Assembling the Dyna-Meter System



- Make sure the **DSO-152 Oscilloscope** is charged and ready for use( you can charge/power the oscilloscope while in use if necessary)
- Connect the **MXC male to BNC Female Connector** to either end of the **6ft male-to-male RG9 BNC Cable**, slotting the peg and twisting to lock in place.



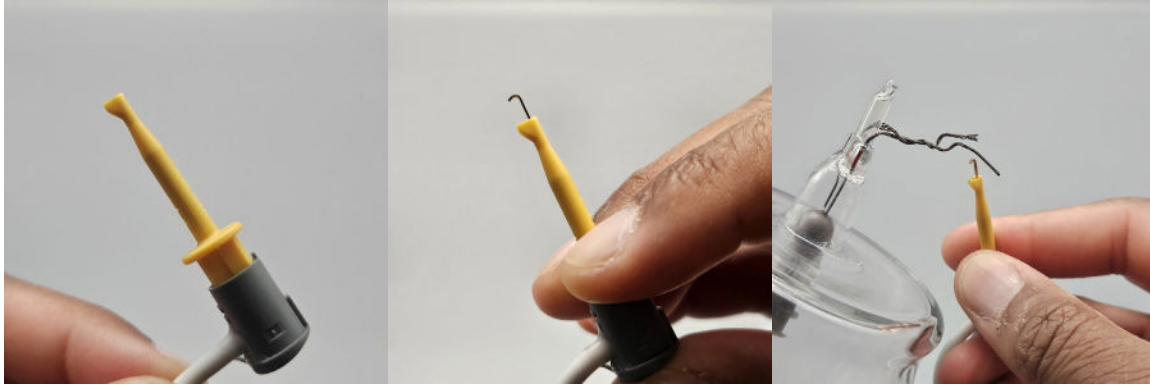
- Connect the end of the cable with the **MXC male to BNC Female Connector** to **DSO-152 Oscilloscope** on the top left side of the device.
- Acquire the **Dyna-Meter Probe** and connected to the free end of the **RG9 BNC Cable**, slotting the peg and twisting to lock in place.



## 5. Set Up for Use



- Plug-in **Grounded Plug** in to a Grounded Outlet. The oscilloscope must be grounded to protect the Probe and Oscilloscope from damage, as well as allow the Oscilloscope to measure accurately, and allow for it be charged while in use.

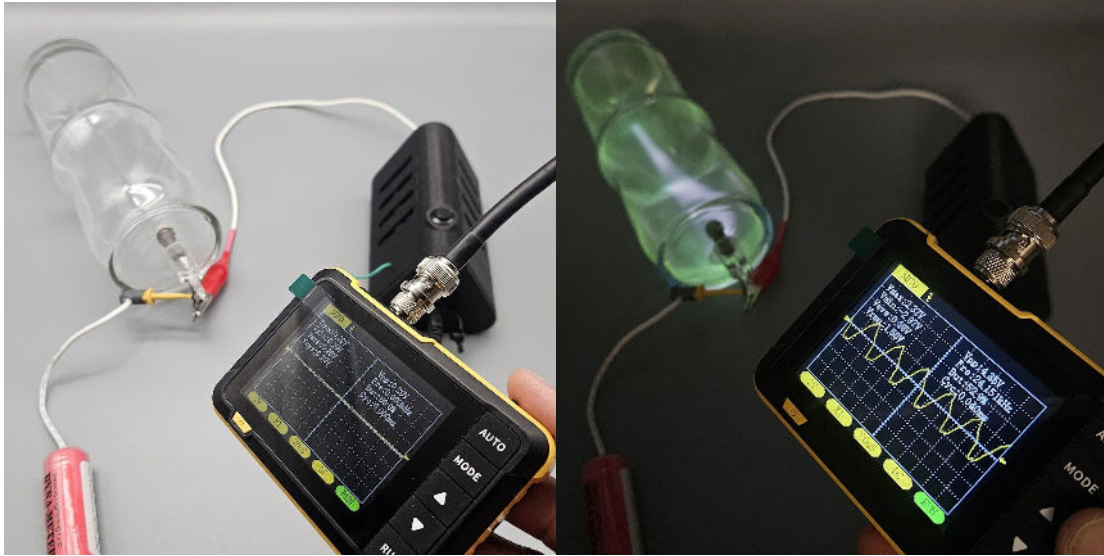


- Locate the **Dyna-Meter Probe** and the **HV Hook Clip**.
- Squeeze the back end (grey) and front (yellow) of the **HV Hook Clip** between your finger and thumb to reveal the hook, then clamp onto one or both of the *electrode wires*. This hook is spring loaded and is designed to clamp the wire for a secure hold.

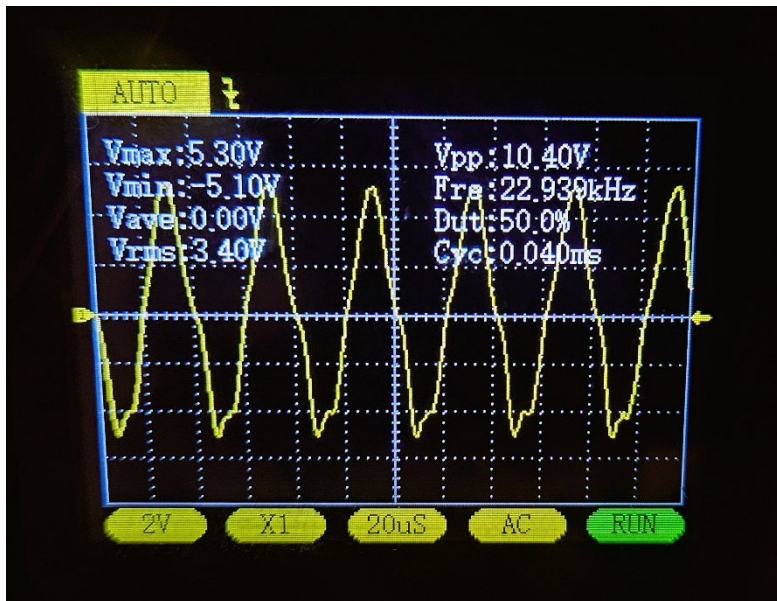


- After the **HV Hook Clip** has been Connected to the *electrode wire*, connect the **HV lead** of your **Plasma Driver** to the *electrode wire*, so that the **HV Hook Clip** is between the electrode and the **HV lead** from the **Plasma Driver**. *This ensures most accurate reading.*
  - a. If there isn't a clip on your **HV Lead**, you can also use the **HV Hook Clip** to grasp the **HV Lead** and *electrode wire* together.

## 6. How to Use the Dyna-Meter System



- Make sure the **Dyna-Meter Probe** is in a secured position, and place the **DSO-152 Oscilloscope** at a distance from the **Probe**. The **BNC Cable** should hang loosely at length without bundling or wrapped to allow for accurate reading.
- Then you can turn on the **DSP-152 Oscilloscope** by pressing and holding the power button ( to turn off a single press).
  - a. If the **Plasma Driver** is OFF, you'll see low electrical activity.
  - b. The number you will focus on in this device is **the Vpp** aka Voltage Peak-to-peak, this will correlate with you output voltage of your **Plasma Driver**.



## Basic Operation & Measuring

- To use the Dyna-Meter, first find your Plasma Driver's rated maximum output voltage — this is the reference figure every reading will be compared against.  
**Example:** the oscilloscope screen shown above was captured on a krypton-argon-filled vessel powered by a 10kV Neon-21 driver.
  - a. The 10kV Neon-21 driver is rated for a maximum output of ~10kV.
  - b. **The Vpp on the screen reads 10.40V. The DSO-152 only displays in 1x or 10x ranges, not the Dyna-Meter probe's true measurement range, so this raw reading has to be scaled up to reflect the actual output voltage.**
  - c. The Dyna-Meter probe steps down the signal at a fixed 1000:1 ratio (see Specifications), so the actual output equals the displayed Vpp × 1000 — shifting the decimal three places. Here, 10.40V × 1000 = 10,400V (10.4kV).
- That reading sits right around the driver's 10kV rated max — the transformer is running near its full output to sustain the plasma in this vessel.
- **Note:** Compare your scaled reading to the driver's rated max:
  - a. if it comes in lower, the gas mixture is efficient and the driver isn't working at full output to sustain it.
  - b. If it is above the rated max, the mixture is less efficient — the driver is working harder, which brings added heat buildup and, over time, a shorter driver lifespan.
- We don't yet have a defined threshold for how far above rated max becomes damaging; that's still being characterized.
- Watch for it alongside visible cues like plasma dimming or a reduced fill within the vessel, and treat readings meaningfully above rated max as a signal to back off the mix, not just a number to log.

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## 7. Safety Guidelines

Follow these guidelines any time you handle the Dyna-Meter, the DSO-152 oscilloscope, or your Plasma Driver.

### **General Safety Tips**

- Treat every high-voltage connection as live until you've confirmed the Plasma Driver is powered off and fully discharged.
- Keep your work area clean, dry, and free of clutter, and never operate the Dyna-Meter with wet hands or in a humid environment.
- Handle the probe, cable, and oscilloscope only by their insulated housings — never touch exposed leads, connectors, or electrode wires while the system is powered.

### **Personal Protective Equipment (PPE)**

- Safety glasses or goggles to protect against arcing or sparks.
- Non-conductive, closed-toe footwear.

### **Emergency Procedures**

- If someone experiences an electrical shock, do not touch them while they may still be in contact with an energized source — cut power at the **Plasma Driver** first, then check responsiveness and call emergency services if needed.
- If the equipment shows signs of failure such as smoke, a burning smell, or unusual heat, power down the Plasma Driver and unplug the oscilloscope immediately and do not attempt to continue use.

### **Hazardous Situations to Avoid**

- Using the probe or oscilloscope near water or in a wet environment.
- Running **the Plasma Driver** beyond its rated maximum output for extended periods — this increases heat buildup and fire risk (see Basic Operation & Measuring).
- Touching the probe, HV Hook Clip, or cable connections while the Plasma Driver is powered on — always power down before adjusting connections.

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## 8. Technical Support and Warranty Information

### Warranty

Taming Lightning LLC warrants the DSO-152 Dyna-Meter's handmade probe against defects in materials and workmanship for **90 Days** from the original date of purchase. This warranty covers parts and labor for the probe and any Taming Lightning-built components.

The included **FNIRSI DSO-152 oscilloscope** is a third-party component and is covered solely under FNIRSI's manufacturer warranty, not by Taming Lightning LLC — except where a failure is caused by Taming Lightning's assembly or integration.

#### **This warranty does not cover:**

- Normal wear and tear
- Damage from misuse, drops, moisture, or unauthorized modification
- Damage from improper voltage or use outside intended operating parameters
- Unauthorized repair or opening of the probe housing

**Installing or operating this device incorrectly may void this warranty.** This product involves high voltage. Install and operate only in accordance with this guide, and only if you have appropriate training in high-voltage safety.

To make a warranty claim, contact Taming Lightning LLC at [store@taminglightning.net](mailto:store@taminglightning.net) with your proof of purchase and a description of the issue.

Full warranty, returns, and RMA terms are available at [taminglightning.net/warranty](https://taminglightning.net/warranty)

## Returning or Replacing Parts

Returns of unused, unopened stock items are accepted within 14 days of delivery, subject to a 15% restocking fee.

Items that have been installed, wired, or used are not eligible for standard return but may qualify under the warranty policy above.

Custom or made-to-order units are final sale, except in cases of manufacturer defect.

To initiate a return, warranty claim, or replacement request, contact our support team by email or phone, or log in to your account and submit a request through the support form.

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## Appendix

This appendix provides supplementary reference material — a glossary of key terms, pointers to diagrams elsewhere in this guide, and calibration guidance — to support installation, use, and troubleshooting of the Dyna-Meter system.

### Glossary

- **HV (High Voltage)** — Voltage levels significantly above standard household electricity, typically several kilovolts or more, requiring specialized safety precautions.
- **AC (Alternating Current)** — Electrical current that periodically reverses direction, as opposed to direct current (DC).
- **Oscilloscope** — An electronic instrument that displays and measures how a voltage signal changes over time, used here to read the Dyna-Meter Probe's output.
- **Capacitive Voltage Divider** — A circuit that uses capacitors to proportionally step down a high-voltage AC signal to a lower, measurable level.
- **Dyna-Meter Probe** — The HV AC probe component that connects to the electrode wire and steps down the measured voltage for display on the oscilloscope.
- **HV Hook Clip** — The spring-loaded clip on the Dyna-Meter Probe used to securely attach the probe to an electrode wire or HV lead.
- **Grounding Plug** — The ground connection on the Dyna-Meter Probe that must be plugged into a grounded outlet for safe and accurate operation.
- **V<sub>pp</sub> (Voltage Peak-to-Peak)** — The difference between the maximum and minimum voltage of a waveform; the primary reading used to correlate with Plasma Driver output.
- **Plasma Driver** — The high-voltage transformer or driver circuit that energizes the electrodes being measured by the Dyna-Meter.
- **Bandwidth** — The maximum frequency range an instrument can accurately measure; the DSO-152 oscilloscope has a bandwidth of 200 kHz.

- **Sampling Rate** — The rate at which the oscilloscope digitizes an incoming signal, expressed in samples per second (the DSO-152 samples at 2.5MS/s).
- **BNC Connector** — A twist-lock coaxial connector used to join the RG9 cable to the oscilloscope and probe.
- **Impedance** — A measure of opposition to alternating current in a circuit, relevant to how the probe and cable interact with the signal being measured.