electro-tech systems

M 300 Static Field Meter

Operating Manual

Contents

Products described in this manual are designed and assembled in the U.S.A. by

Electro-Tech Systems, Inc.

700 West Park Avenue

Perkasie, PA 19844

www.electrotechsystems.com

I. Important Safety Information

WARNING

This symbol accompanied by the word “WARNING” calls attention to an act or a condition which can lead to serious personal injury or death of operators and bystanders.

CAUTION

This symbol accompanied by the word “CAUTION” indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury. The symbol without any warning text indicates potential damage to device when misused.

This symbol indicates the presence of hazardous AC or DC voltages constituting the risk of electric shock.

This symbol indicates a risk of fire due to improper handling or failure of device. For continued protection against risk of fire, when replacing fuses use only fuses of the specified type and current ratings.

This symbol indicates the danger of an electro-static discharge to which equipment may be sensitive. Observe all precautions for handling electrostatic sensitive devices.

These symbols indicate extreme temperature which can cause burns or frostbite. Avoid contact with surface. Failure to follow precautions may result in moderate to severe injury.

SAFETY INSTRUCTIONS

The equipment described in this manual is designed and manufactured to operate within defined design limits. Any misuse may result in electric shock or fire. To prevent the equipment from being damaged, the following rules should be observed for installation, use and maintenance. **Read the following safety instructions before operating the instrument.**

POWER

POWER CORD: Use only the power cord specified for this equipment and certified for the country of use. If the power (mains) plug is replaced, follow the wiring connections specified for the country of use. When installing or removing the power plug, **hold the plug, not the cord.**

GROUNDING: The power cord provided is equipped with a **3-prong grounded plug (a plug with a third grounding pin).** This is both a safety feature to avoid electrical shock and a requirement for correct equipment operation. If the outlet to be used does not accommodate the 3-prong plug, either change the outlet or use a grounding adapter.

FUSES: Replace fuses only with those having the required current rating, voltage, and specified type such as normal blow, time delay, etc. **DO NOT** use makeshift fuses or short the fuse holder. This could cause a shock or fire hazard or severely damage the instrument.

OPERATION

CAUTION

DO NOT OPERATE WITH COVERS OR PANELS REMOVED. **Voltages inside the equipment consist of line (mains) that can be anywhere from** 100-240VAC.

DO NOT OPERATE WITH SUSPECTED EQUIPMENT FAILURES. If any odor or smoke becomes apparent turn off the equipment and unplug it immediately. Failure to do so may result in electrical shock, fire, or permanent damage to the equipment. Contact the factory for further instructions.

DO NOT OPERATE IN AN EXPLOSIVE ATMOSPHERE. Operating the equipment in the presence of flammable gases or fumes **constitutes a definite safety hazard**. For equipment designed to operate in such environments the proper safety devices must be used such as dry air or inert gas purge, intrinsic safe barriers and/or explosion-proof enclosures.

DO NOT IMPEDE THE CHAMBER FROM VENTING EXCESS PRESSURE. Available dehumidification systems include open loop systems that pump external air into the chamber. If the chamber is not allowed to vent, pressure can build up and cause serious damage to the chamber.

USE DISTILLED OR DEIONIZED WATER SOURCE FOR HUMIDIFICATION. Build-up of contaminates on the transducer will cause stress to the transducer and electronics and resulting in premature failure and invalidate the warranty.

DO NOT USE IN ANY MANNER NOT SPECIFIED OR APPROVED BY THE MANUFACTURER. Unapproved use may result in damage to the equipment or present an electrical shock or fire hazard.

I. Informations Importantes d'inocuite

WARNING

Ce symbole accompagné du mot « AVERTISSEMENT »(WARNING) attire l'attention sur un acte ou une condition qui peut entraîner des blessures graves ou la mort des opérateurs et des passants.

CAUTION

Ce symbole accompagné du mot « ATTENTION » (CAUTION)indique une situation potentiellement dangereuse qui, si elle n'est pas évitée, pourra entraîner des blessures mineures ou modérées. Le symbole sans texte d'avertissement indique des dommages potentiels à l'appareil en cas d'utilisation abusive.

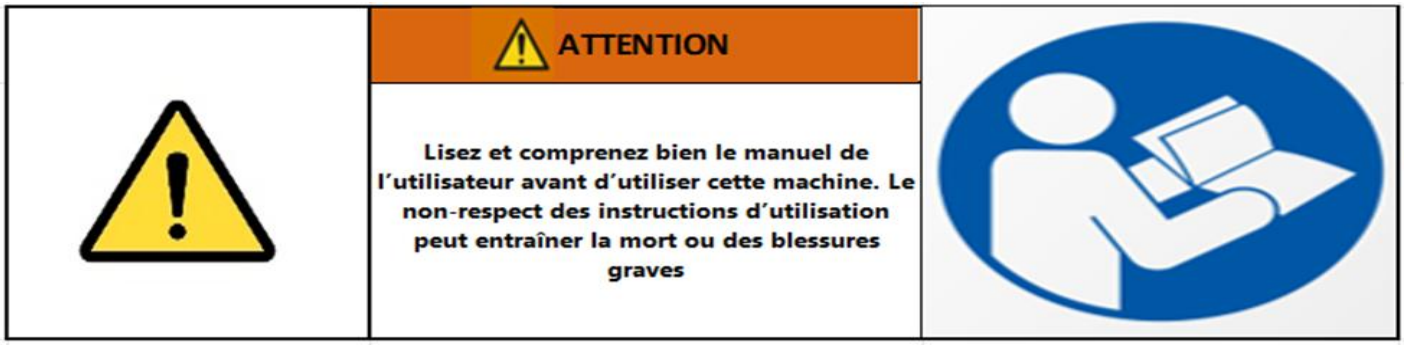
Ce symbole indique la présence d'une climatisation dangereuse ou d'un courant continu constituant le risque de choc électrique.

Ce symbole indique un risque d'incendie dû à une mauvaise manipulation ou à une défaillance de l'appareil. Pour une protection continue contre les risques d'incendie, lors du remplacement des fusibles, utilisez uniquement des fusibles du type et des valeurs nominales spécifiés.

Ce symbole indique le danger d'une décharge électrostatique à laquelle l'équipement peut être sensible. Observez toutes les précautions à prendre pour manipuler les appareils sensibles a l'electicite statique.

Ces symboles indiquent une température extrême qui peut causer des brûlures ou des engelures. Éviter le contact avec la surface. Le non-respect des précautions peut entraîner des blessures modérées à graves.

CONSIGNES DE SÉCURITÉ



L'équipement décrit dans ce manuel est conçu et fabriqué pour fonctionner dans les limites de conception définies. Toute mauvaise utilisation peut entraîner un choc électrique ou un incendie. Pour éviter que l'équipement ne soit endommagé, les règles suivantes doivent être respectées pour l'installation, l'utilisation et l'entretien. Lisez les consignes de sécurité suivantes avant d'utiliser l'instrument.

POUVOIR

CORDON D'ALIMENTATION : Utilisez uniquement le cordon d'alimentation spécifié pour cet équipement et certifié pour le pays d'utilisation. Si la fiche d'alimentation (secteur) est remplacée, suivez les connexions de câblage spécifiées pour le pays d'utilisation. Lors de l'installation ou du retrait de la fiche d'alimentation, **tenez la fiche, pas le fil.**

MISE À LA TERRE : Le cordon d'alimentation fourni est équipé d'une **fiche à 3 broches avec mise à la terre (une fiche avec une troisième broche de mise à la terre).** Il s'agit à la fois d'une fonction de sécurité pour éviter les chocs électriques et d'une exigence pour le bon fonctionnement de l'équipement. Si la prise à utiliser n'est pas compatible avec la fiche à 3 broches, changez la prise ou utilisez un adaptateur de mise à la terre**.**

FUSIBLES : Remplacez les fusibles uniquement par des fusibles ayant le courant nominal, la tension et le type spécifié tels que fusion normale, temporisation, etc. **N'UTILISEZ PAS** de fusibles de fortune ou ne court-circuitez pas le porte-fusible. Cela pourrait entraîner un risque d'électrocution ou d'incendie ou endommager gravement l'instrument..

OPÉRATION

PRUDENCE

NE PAS UTILISER AVEC LES COUVERCLES OU LES PANNEAUX RETIRÉS. **Les tensions à l'intérieur de l'équipement consistent en une ligne (secteur) pouvant aller de** 100 à 240 VAC.

NE PAS UTILISER AVEC DES PANNES D'ÉQUIPEMENT SUSPECTES. Si une odeur ou de la fumée se dégage, éteignez l'équipement et débranchez-le immédiatement. Le non-respect de cette consigne peut entraîner un choc électrique, un incendie ou des dommages permanents à l'équipement. Contactez l'usine pour plus d'instructions.

NE PAS UTILISER DANS UNE ATMOSPHÈRE EXPLOSIVE. L'utilisation de l'équipement en présence de gaz ou de fumées inflammables constitue un danger certain pour la sécurité. Pour les equipement concus pour fonctionnner dans de tels environnement, des dispositifs de sécurité appropriés doivent être utilisés, tels que la purge d'air sec ou de gaz inerte, les barrières de sécurité intrinsèque et/ou les enceintes antidéflagrantes..

NE PAS EMPÊCHER LA CHAMBRE D'ÉVACUER L'EXCÈS DE PRESSION. Les systèmes de déshumidification disponibles comprennent des systèmes en boucle ouverte qui pompent l'air extérieur dans la chambre. Si la chambre n'est pas autorisée à s'aérer, la pression peut s'accumuler et causer de graves dommages à la chambre.

UTILISEZ UNE SOURCE D'EAU DISTILLÉE OU DÉSIONISÉE POUR L'HUMIDIFICATION. L'accumulation de contaminants sur le transducteur causera des contraintes au transducteur et à l'électronique et entraînera une défaillance prématurée et invalidera la garantie.

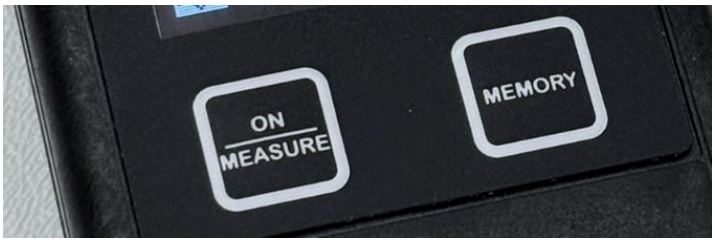
NE PAS UTILISER D'UNE MANIÈRE NON SPÉCIFIÉE OU APPROUVÉE PAR LE FABRICANT. Une utilisation non approuvée peut endommager l'équipement ou présenter un risque d'électrocution ou d'incendie.Description of Contents

II. Description of Components

Included:

Item	***Qty.***	***Description***
M 300	1	Static meter
Case	1	Black Case

III. Quick Start Guide



Throughout the instructions, you may see reference to S
Short Press and **Long Press** of the buttons.

Short Press = Firm and distinct click of the membrane button. Do not hold it down.

Long Press = Press the button and Hold the button down for approximately 1 second.

Extra Long Press = Press the button and Hold the button down for approximately 2 seconds. The Extra Long Press is only used with the ON/MEASURE button to manually power off the unit.

Step 1 – Power ON

When you first unpack the M 300, it may be in Ship Mode to prevent the battery from draining. To wake up the unit, plug the unit into a USB-C power adapter. The unit should automatically wake.

After waking the unit from Ship Mode the first time, Short Pressing the ON/MEASURE button will wake the unit up.

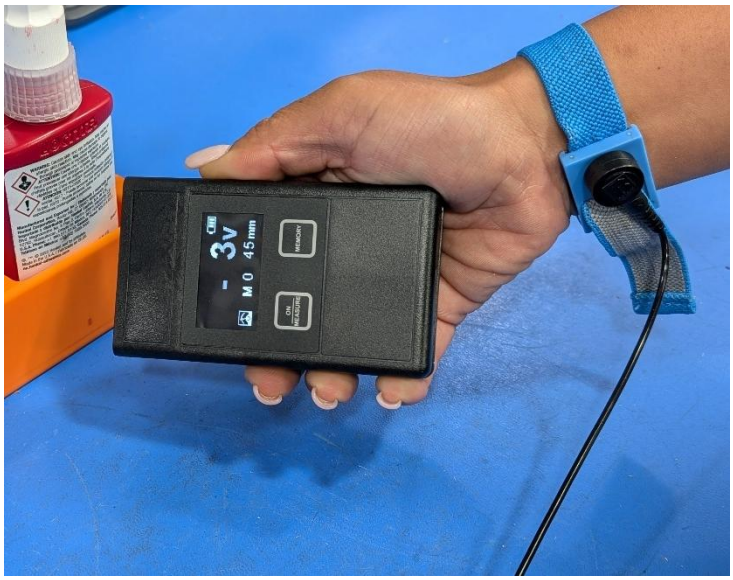
The unit will automatically go into sleep mode after about 5 minutes if no buttons are pressed to save battery power. Simply Short Press ON/MEASURE again to wake the unit up. The unit will resume operating where it left off.

To manually power off the unit, **Extra Long Press** (press and hold the ON/MEASURE button for about 2 seconds) and release.

Step 2 – Battery check

With power ON, check the display. The battery indicator is in the top right corner. The battery is fully charged if all segments are filled. If the battery is depleted, plug the static field meter into a USB-C power adapter with a USB-C cable.

A USB-C power adapter and cable are not included. Any commonly available consumer or commercial USB-C power adapter and cable utilized with phones or other devices can be utilized.



Step 3 – Grounding the M 300.

The M 300 case is made of conductive material. For the best measurements, earth ground yourself utilizing a wrist strap or by directly touching a grounded surface while measuring to provide the M 300 with a ground reference.

The field meter will still function without the earth ground reference but will not be as accurate.

Step 4 – Measure

The M 300 incorporates an advanced Time-of-Flight (ToF) distance sensor. This technology uses invisible, eye-safe laser pulses to precisely measure the time it takes for light to bounce back from a target. This allows the firmware to automatically adjust the measurement value, ensuring highly accurate readings across a dynamic range of 1mm to 200mm.

The voltage measurement is displayed on the screen.

Step 4 – Store in Memory

The M 300 holds up to **10 measurements in non-volatile memory**, allowing you to log a series of readings and review them later.

Long Press to record the current information on the screen in memory.

The value will be stored in the memory location specified on the screen. In this example, -10V would be stored in memory location **M0**.

Step 5 – Resume Measuring

To resume measuring, **Short Press** the Measure button.

V. Operating Instructions

The M 300 Static Meters is an accurate, compact electrostatic field meters used for locating and measuring static charge potentials.

Front Panel Description and function

Device	Description	Functionality
1	ON / Measure	• Pressing the ON / Measure button wakes the unit and puts the unit into Measure Mode.
2	Memory	• Short Pressing this button enters Memory Mode. See **Managing Memory** and **Saving Readings** later in this section for details. • Long pressing the button while in Measure Mode will store the current value on the screen into the memory location shown on the screen.
3	Mode	• The icon indicates the Mode of operation. There are two modes, Memory Mode and Measure Mode. The screen above shows the icon for Measure Mode. Single pressing the Memory button will change the icon to Memory Mode.

4	Memory Location	• There are 10 memory locations (M0 through M9). When storing data or viewing data, this indicator will show you which memory location is being utilized.
5	Distance	• The meter operates in a range of 1mm to 200mm. The distance is displayed in mm. The information is utilized to automatically compensate for calculating the voltage and displayed as reference information. • If you prefer to utilize the meter from a certain fixed distance (e.g. 25mm), you can utilize this readout to determine your distance.
6	Voltage	• The voltage is displayed on the screen. If the voltage is negative, there will be a minus sign in front of the value. The display will show up to 3 digits and resolution is ±1 volt up to ±30 kilovolts. • The voltage will display “v” for volts or “kV” for kilovolts.
7	Battery Level	• The battery charge icon is a 4-segment display of the battery level. When the power is low, the unit can be plugged into a laptop USB-C connection or USB-C power adapter to charge. • When the unit is connected via USB-C to a laptop or USB-C power adapter, the unit will display a plug icon and the battery will charge as needed.
8	USB-C connector	The USB-C connector is located at the bottom of the unit. This connection can be utilized for both charging and pulling the data in memory for the unit.

MAKING A MEASUREMENT

Advanced Distance Sensing: Say goodbye to the need for perfect positioning. The M 300 incorporates an advanced **Time-of-Flight (ToF) distance sensor**. This technology uses invisible, eye-safe laser pulses to precisely measure the distance to a target. This allows the firmware to automatically adjust the measurement value, ensuring highly accurate readings across a dynamic range of **1mm to 200mm**. This versatility is a significant improvement over other static meters, which typically limit measurement to a fixed 1-inch (25mm) distance.

The measurement accuracy is dependent on a stable ground reference and plus the “aspect ratio” that relates the size of the object to be measured to the measurement distance. This aspect ratio should be at least 4:1 for best accuracy, i.e. the surface should be at least a 4” (102mm) square when measuring at a 1” (25mm) distance.

Measuring the charge on an object smaller than the recommended aspect ratio will result in lower reading on the Meter.

Snapshot Hold Feature

When measuring, experiment with quickly pulling or flicking the meter away from the measured object. When you do, you will see that the last measurement information remains on the screen.

As long as the meter is not pointed at another measurable object within 200mm, the previous data will remain on the screen.

This allows you to review the data and then store it in memory if desired.

MANAGING MEMORY and SAVING READINGS

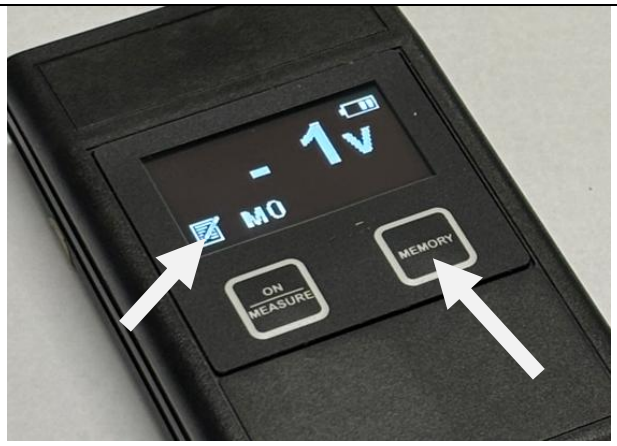
Memory Mode – Reviewing and Clearing Memory

The M 300 holds up to **10 measurements in memory**, allowing you to log a series of readings and review them later.

Short press the memoy button to enter memory mode. You'll see the icon in the bottom left corner change.

In memory mode:

- Short Pressing the memory button will sequentially rotate through the memory locations. This allows you to review the data in memory.
- **Long Pressing** the memory button will clear the memory location and you will see the word "**Empty**" appear where a value was previously stored.



Memory Mode – Setting the Memory Location for your next measurement.

To set the memory location to use for capturing your next measurement, rotate through the memory locations by **Short Pressing** the MEMORY button until you reach the desired memory location.

If desired, you can clear the selected memory location by **Long Pressing** the MEMORY button.

Exiting Memory Mode

When you are ready to record your next measurement in the selected memory location, exit memory mode.

To exit memory mode at any time, **Short Press** the ON/MEASURE button to return to Measure mode.

SETTING THE DATE & TIME

The M 300 holds up to 10 measurements in memory and can **time/date stamp** these measurements for data downloading through the USB-C connection.

Access the Date/Time Setting Screen

To access the Date/Time screen, **Short Press** both the ON / MEASURE and MEMORY buttons in unison.

Navigating and Updating

On the time/date screen, only the **MEMORY** button is utilized to navigate the screen and update the date and time.

Long Pressing the MEMORY button will move the cursor to the next integer in the date and time fields starting at the top left. The digit being edited will blink.

Short Pressing the MEMORY button will increment the digit at the current cursor location.

Exiting the Date/Time Screen

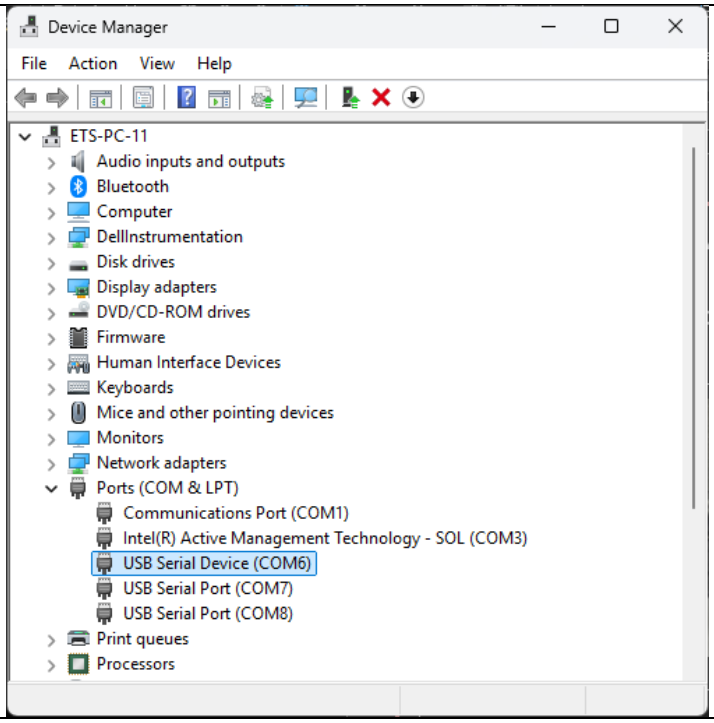
To exit Memory mode at any time, **Short Press** the ON/MEASURE button to return to Measure mode.

DOWNLOADING DATA

The M 300 holds up to **10 measurements in memory**, allowing you to log a series of readings and review or download them later.

Connect the Meter to a Computer

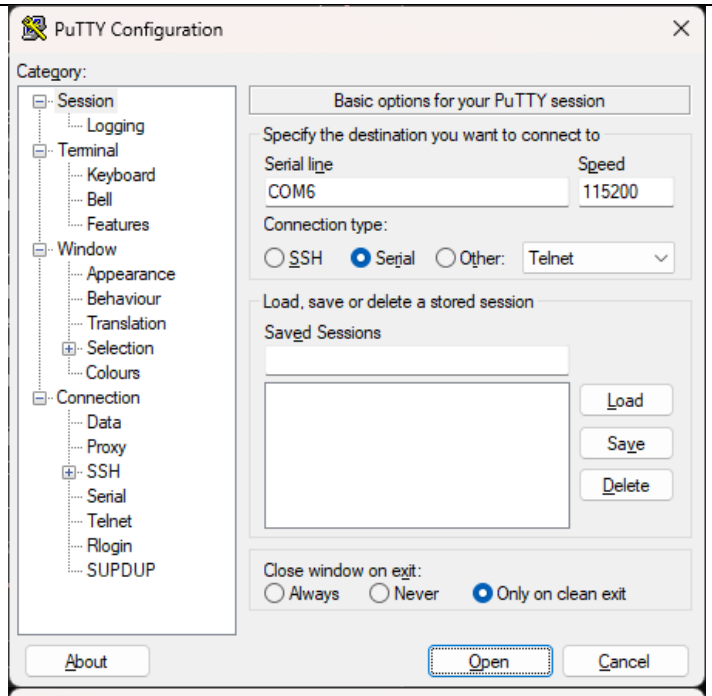
To connect the meter to a computer, utilize the USB-C connection found at the bottom of the meter and any standard USB-C data cable.

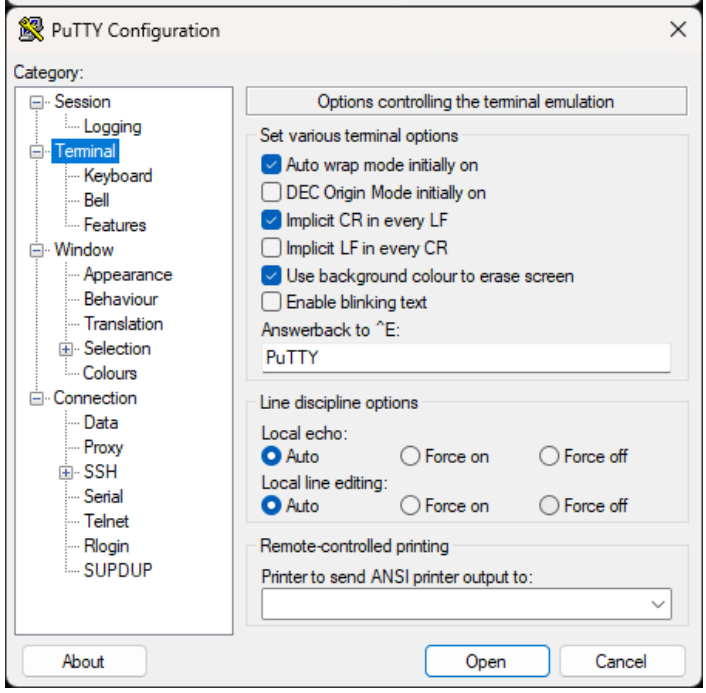


Determine Device Identification

The meter will appear as a USB Serial Device. Its identification varies by operating system. The following instructions are for Windows users.

The device is assigned a COM Port (e.g., COM6). To find it, open **Device Manager** by pressing the Windows key and typing “Device Manager” in the search window. Look under “**Ports (COM & LPT)**” to find the correct COM Port.





Connect via a Serial Terminal Application

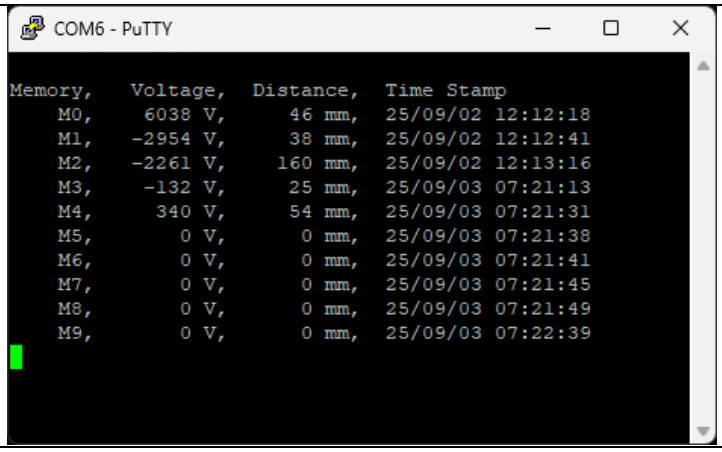
Open your serial terminal application of choice, such as PuTTY. While these instructions are for PuTTY, the process is similar for other programs like Tera Term or MobaXterm.

Configure the connection settings as follows:

- **Connection Type:** Serial
- **Serial Line:** The COM Port you identified in the previous step.
- **Speed (Baud Rate):** 115200

For correct output visibility, go to the Terminal settings and check “Implicit CR in every LF”.

Finally, click “Open” to establish the connection.



Send “m” Command and Collect Data

Press the “m” key and the information in the 10 memory locations will appear (empty memory locations appear as “0 V, 0mm”). You can copy/paste this information to store it wherever you wish.

VI. Specifications

Model 300 Electrostatic Field Meter

Display	OLED display, 128x64
Controls	ON/MEASURE and MEMORY metal dome switches
USB-C	USB-C supports USB 2.0 and USB 3.1
Battery	Lithium-Ion 1080Mah, 3.7V, 3.99Wh. UN 38.3 certified.
Battery Life	Battery life is approximately 60 hours continuous operation before recharging.
Size	2.4”W x 4.2”L x 1.3”D (62x106x22mm)
Weight	109 grams (0.24 lbs) with battery
Operating Conditions	Operates at 0 - 50°C and 0 – 85% RH (non-condensing). Accuracy is unaffected by air ionization.
Max Voltage Range	-30.0 kV to +30.0 kV
Distance Range	1mm to 200mm
Resolution	1 volt from 0 to 999 volts. 10 volts from 1.00kV to 9.99kV. 100 volts from 10.0kV to Max Range.
Accuracy	±5%

VI. Calibration and Maintenance

MAINTENANCE

No routine maintenance is required. If for any reason the Meter is not working correctly, contact ETS at 215-887-2196 ext. 220 for assistance. **NOTE:** There are no user serviceable parts. Any unauthorized service will void the warranty and result in additional repair charges.

To return equipment to ETS for repair it is first necessary to obtain an RMA number, please call 215-887-2196 or email service@ets2.com

BATTERY CHARGING

The M 300 operates using a lithium-ion battery. The battery can be recharged 300 to 500 times before noticeable performance degradation. The battery is accessible and replaceable if necessary.

Battery life is more than 20 hours under normal use. The unit has a battery indicator. To recharge the battery simply plug the unit into any standard USB-C charger or laptop via a USB-C cable.

VERIFICATION

The proper functioning of the Static Meters can be checked using a calibrated Charge Plate Monitor (CPM). Utilizing the CPM controls, apply approximately 1,000 volts to the charge plate and position the static meter approximately 25mm (1 inch) away from the plate.

The Meter should read the applied voltage ±5%. A significant difference in reading indicates that the Static Meter is out of calibration and it should be returned to ETS for repair and/or recalibration.

CALIBRATION

Calibration should be completed by an accredited calibration laboratory. ETS is an ISO 17025 accredited lab for calibration. To return equipment to ETS for calibration, please call 215-887-2196 or email service@ets2.com

VII. Warranty

Limited Warranties. Seller warrants that all goods manufactured and delivered hereunder shall (a) conform to any samples, drawings, specifications or other written documents provided to Seller by Buyer, or approved by Buyer to Seller and (b) be free from all defects in workmanship and material. Buyer's sole remedy against Seller for breach of either of the specifically mentioned warranty shall be the repair or replacement, at Seller's sole option, of the defective workmanship or material. Seller expressly disclaims all other warranties, express and/or implied, including but not limited to those of merchantability and fitness for a particular purpose. In no event shall Seller be liable, under either warranty or otherwise, to Buyer in excess of the purchase price of the products paid to Seller by Buyer. In no event shall Seller be liable for any loss or damage arising directly or indirectly from the use of the product or for consequential or incidental damages. Seller's specified warranties will expire and lapse (i) for renewable items (such as gloves, iris ports and desiccants), sixty (60) days from date of shipment and (ii) for all standard equipment and otherwise nonrenewable items, one year from date of shipment.