

STANDARDIMAGING®



MAX Elite ELECTROMETER

REF 90025

U S E R M A N U A L

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PATENT PENDING

General Precautions

Warnings and Cautions alert users to dangerous conditions that can occur if instructions in the manual are not obeyed. Warnings are conditions that can cause injury to the operator. Cautions are conditions that can cause damage to the equipment.



WARNING: Proper use of this device depends on careful reading of all instructions and labels.



WARNING: An electrical shock hazard of up to 1000 VDC is possible whenever the bias voltage is active. Always set the bias to the 0% or 0 VDC level whenever a device is connected to or disconnected from the MAX Elite.



WARNING: This unit is not intended to be used in flammable mixture atmospheres. Do not use with flammable anesthetic mixture with air, with oxygen, or nitrous oxide.



WARNING: Where applicable, Standard Imaging products are designed to be used with the versions of common radiation delivery devices, treatment planning systems and other products or systems used in the delivery of ionizing radiation, available at the time the Standard Imaging product is released. Standard Imaging does not assume responsibility, liability and/or warrant against problems with the use, reliability, safety, or effectiveness that arise due to the evolution, updates or changes to these products or systems in the future. It is the responsibility of the customer and/or user to determine if the device can be properly used with these products or systems.



WARNING: To avoid risk of electric shock, the device must only be connected to a supply main with protective earth.



WARNING: No modification of this device is allowed.



CAUTION: Input voltage on triax connector should be no greater than +5 V or -5 V.



CAUTION: This device must never be submerged in water or a solvent to clean, or scrubbed with an abrasive cleaner, as it is not protected against liquid ingress.



CAUTION: Do not drop or mishandle the device. Calibration factor changes may result.



CAUTION: Do not use sharp objects on the touchscreen display or speaker holes.



CAUTION: Do not disassemble device since it may result in change of calibration factor. Refer servicing to qualified individuals.



CAUTION: Damaged or kinked ionization chamber cables or extension cables should not be used.



CAUTION: Upon power on, allow for proper warm-up.



CAUTION: Charge measurements made in modes other than those used by the calibration agency may result in measurement errors that exceed the calibration uncertainty.



CAUTION: Temperature/pressure correction is only applied to radiological units. It is not applied to electrical units.



CAUTION: Proper use of this device requires a current calibration. Calibrations should be completed every two years.



CAUTION: The device should not be connected to an ion or well chamber that is used in direct contact with a patient.



CAUTION: For best performance, select the lowest range possible for the intended measurement.



CAUTION: Use the provided power supply or equivalent as identified by Standard Imaging. Contact Standard Imaging for additional information.



CAUTION: Do not use the Exradin W1 Scintillator with the general measurement mode. Always use the Scintillator Measurement mode.



CAUTION: Do not attempt to measure or inject currents larger than the specified limits of the range being used or incorrect charge measurements may occur.



CAUTION: Cybersecurity is a shared responsibility between Standard Imaging and the customer. Secure use of this product is dependent upon the proper utilization of passwords, firewalls, networks, computer platforms, operating systems, and data storage.

Table of Contents

General Precautions.....	2
Table of Contents.....	5
1 Overview.....	8
1.1 Essential Performance	8
1.2 Conventions Used in this User Manual	8
1.3 What You Should Already Know	9
1.4 Network Connection	9
1.5 Unboxing.....	10
2 Device Description.....	10
2.1 MAX Elite Electrometer - Front Panel Description.....	10
2.2 MAX Elite Electrometer – Rear Panel Description	11
2.3 MAX Elite Electrometer – Dual Purpose Handle	11
3 General Operation	12
4 Turning the Device On/Startup Screen.....	15
5 General Measurement Mode.....	16
6 Measurement Configuration Options.....	17
6.1 Channel Selection.....	17
6.2 Selecting the Range of Measurement.....	18
6.3 Enabling and Selecting Bias Voltage.....	18
6.4 Apply System Factor.....	20
6.5 Temperature/Pressure Correction	20
6.6 Collection Modes.....	21
6.7 Display Chart.....	23
6.8 Performing a System Zero.....	25
6.9 Start Collection/Stop Collection/System Clear	25
6.10 Capture Rate	26
7 Display Data.....	26
7.1 Charge/Rate/Dose	26
7.2 Display Ratios.....	26
7.3 Measurement Information and Saving Session Data	26
8 Nuclide Calibrator Page.....	27
9 The Data Table	28
9.1 Saving Measurement Data.....	29

10	Detector Library	29
10.1	Adding a New Detector	30
10.2	Editing an Existing Detector/Calibration	32
10.3	Adding a Calibration to an Existing Detector.....	33
10.4	Deleting an Existing Detector/Calibration.....	33
11	Data Matrix Entry of Calibration Data	33
12	Check Sources.....	33
12.1	Adding a New Source	34
12.2	Editing an Existing Source.....	35
12.3	Calculating Projected Activity	36
12.4	Deleting an Existing Source	37
13	Preferences	37
13.1	General Device Preferences.....	37
13.2	Electrometer Measurement Preferences.....	40
13.3	Rate Averaging	42
13.4	Calibration Service Log and Factors.....	42
13.5	Password Protection	44
13.6	Software Version and Updates.....	44
13.7	Network Connections.....	44
13.8	Remote operation	45
14	Troubleshooting	46
14.1	Questionable Readings.....	46
14.2	No Response.....	46
14.3	Electromagnetic or Other Interference	46
14.4	Cannot Detect USB Flash Drive	46
14.5	Zero Drift.....	46
15	Parts and Accessories List	47
16	Maintenance	47
16.1	Triaxial Connector Cleaning Procedure	48
17	Description of Symbols	49
18	Electromagnetic Compatibility.....	51
18.1	Electromagnetic Emissions	51
18.2	Electromagnetic Immunity	51
18.3	Recommended separation distances.....	54

19	Explanation of Saved File Export	55
19.1	Measurement Data	55
20	Features and Specifications.....	56
21	WARRANTY STATEMENT- 4424-18.....	59
22	Serialization Information	60
23	Customer Care Policy Statement.....	60
24	Customer Responsibility	61
25	Service Policy	62
26	Return Policy.....	62
27	SOFTWARE LICENSE AGREEMENT	63

1 Overview

The MAX Elite is a high-end, reference grade electrometer used for taking precision measurement of ionizing radiation, with added chamber library, voltage requirements, readout capability (dose and dose rate) and triggered (threshold) detection.

The MAX Elite is available in three configurations:

- MAX Elite 1: A single-channel configuration.
- MAX Elite 2: A dual-channel configuration with extended bias range, higher measurement precision, a web client interface that duplicates the functionality of the touchscreen display, data plotting capability and a camera capable of reading data matrix code labels.
- MAX Elite 4: A four-channel configuration with extended bias range, higher measurement precision, a web client interface that duplicates the functionality of the touchscreen display, data plotting capability, and a camera capable of reading data matrix code labels.

The MAX Elite is easily controlled by a large 10-inch color touchscreen display, which features a user-friendly interface for quick and efficient operation and the convenient display of multiple measurement parameters at once. To ensure accurate results, the device must be properly calibrated and be used in a controlled environment free of electrical interference.

Certified initial and two-year calibrations of the MAX Elite should be provided by an accredited dosimetry calibration laboratory (ADCL).

NOTE: This user manual refers to version 1.2.0 of the MAX Elite software. Please contact Standard Imaging about receiving the latest MAX Elite software version or a user manual for your version. See the MAX Elite startup splash screen (see Section 4) or the *Setup -> Electrometer -> Software* screen (see Section 13.6) for the software version number.

1.1 Essential Performance

This electrometer is designed to provide precise measurement of electrical current and charge produced by a detector that is exposed to ionizing radiation.

1.2 Conventions Used in this User Manual

This section describes typographic conventions used in this user manual.

<u>Example of Convention</u>	<u>Description</u>
Boldface type	Indicates a button, checkbox, or toggle switch on the device touchscreen.
<i>Italic type</i>	Indicates a user interface heading, page or grouping.
<i>Boldface Italics</i>	Indicates a feature on the device.
“Text in double quotes”	Indicates a user interface element where a value can be changed.

1.3 What You Should Already Know

It is assumed that the operator of the MAX Elite is familiar with operating a touchscreen interface, a personal computer running a Microsoft Windows environment, and the standard technique for using a computer mouse. It is also assumed that the operator is a clinical medical physicist who is aware of the dangers that can arise in high-voltage circuits and is experienced with the use of precision electronic circuits for sensitive measurements. The operator is also assumed to have knowledge of systems used in the delivery of ionizing radiation.

Proper use of the MAX Elite and interpretation of its results are essential and are the sole responsibility of the user. Standard Imaging and its distributor companies are in no way held responsible for misuse of the MAX Elite and/or misinterpretation of its results.

1.4 Network Connection

The MAX Elite is a standalone device that does not require a browser or operating system. The user can optionally access the MAX Elite 2 and MAX Elite 4 (dual- and multiple-channel) configurations through a web client interface, which replicates the touchscreen interface.

Network and connection characteristics:

- Supported connection is DHCP.
- Ethernet cable must be 100 meters or less in length with standard RJ45 connectors on both ends.
- The MAX Elite supports 10/100 Mbit connections. 1000 Mbit (1Gbit) is not supported.
- Minimum of Category 5 Ethernet cable is required to support 100 Mbit connection.
- Supported WiFi includes 802.11 ac/a/b/g/n, 5 GHz and 2.4 GHz
- Supported wireless security protocols are open (no encryption), WEP, WPA, and WPA2.

Browser configuration:

- Javascript must be enabled (allowed) on the web browser used with the MAX Elite.
- Internet Explorer is not supported.

Technical specifications of the network connection:

- Connection protocol: TCP/IP
- Connection port: 80
- Connection type: HTTP
- HTTPS connections are not supported

Information from the MAX Elite will flow via HTTP over TCP/IP network. The MAX Elite is intended for internal networks only and for use with a single web browser session. Multiple sessions, particularly on multiple computers, may cause unintended operations.

Please note that high latency networks will impact the performance of the web browser session.

Connection to an IT network or other equipment could result in previously unidentified risks to patients, operators, or third parties. Users should identify, analyze, evaluate, and control these risks.

Changes, updates, or other alterations in the network connection could introduce new risks that require additional analysis.

1.5 Unboxing

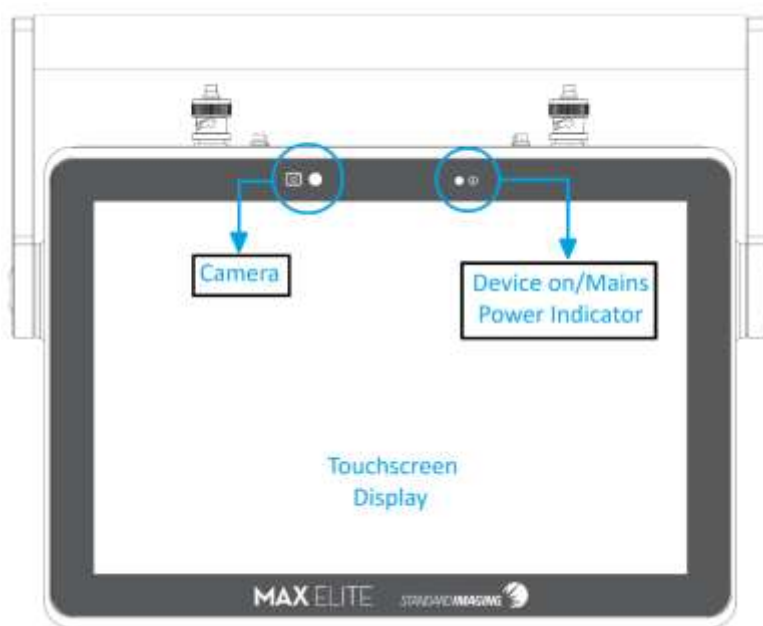
The MAX Elite is shipped with the parts listed in Section 15. The shipping box will be marked for which way is up. Place the box on a solid, flat surface and cut the tape to open the box. Do not use a knife to cut the tape. Unpack the shipping box and identify the parts.

2 Device Description

2.1 MAX Elite Electrometer - Front Panel Description

The front panel of the MAX Elite has the following components:

- **Device On/Mains Power Indicator:** Situated at the top left of the front panel above the touchscreen display, the Device On/Mains Power Indicator will glow green when the device is plugged in and receiving AC power. After ___ of inactivity, the device will enter standby mode and the indicator will flash as a prompt for the user to wake up the device for use. Simply tap the touchscreen to wake up the device.
- **Camera:** The camera is located at the top of the front panel, above the touchscreen, and is capable of reading data matrix code labels. Note that the camera is not available with the MAX Elite 1 configuration.
- **Touchscreen Display:** The primary input device on the MAX Elite is the 10-inch, 1280x800 a-Si TFT active matrix display with an "anti-smudge" coating. No stylus is required to operate the touchscreen; simply using a fingertip will suffice.

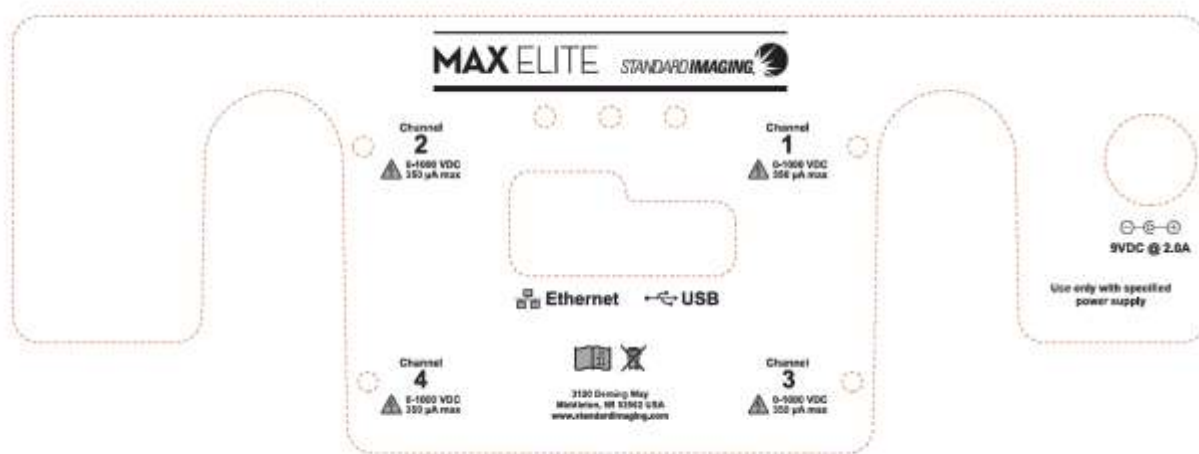


2.2 MAX Elite Electrometer – Rear Panel Description

The rear panel of the MAX Elite has the following components:

- **Power Adapter Input.** Situated at the far left of the rear panel, use only with the provided power supply.
- **Measurement Channel(s):** Connect an ion chamber, well chamber, or other compatible measurement device to any of the channel(s). The MAX Elite 1 configuration has one measurement channel; the MAX Elite 2 configuration has two measurement channels; the MAX Elite 4 configuration has four measurement channels.
- **USB Port:** Located in the center of the rear panel, the USB port supports the insertion of a USB flash drive for saving measurement data. Replacement USB flash drives can be ordered from Standard Imaging.
- **Ethernet Port:** Located in the center of the rear panel, this port enables an ethernet cable to be connected for external control of the device in lieu of using WiFi.
- **Speaker Holes:** These are positioned on the underside of the electrometer. Prevent any objects or liquids from entering the speaker holes.

The image below shows the MAX Elite rear panel label, which identifies each of the four channels (labeled 1-4), the Ethernet port, USB plug, and power adapter input.



2.3 MAX Elite Electrometer – Dual Purpose Handle

The MAX Elite should only be carried by the attached handle to ensure safe transport. The handle also doubles as a display stand, allowing the touchscreen to be accessible at different angles for use and presentation. To adjust the position of the handle, press the center of the handle attachment on both sides of the device to release the handle and allow it to rotate to one of five fixed positions.

3 General Operation

The following are simplified, generalized instructions for taking measurements with the MAX Elite. For a more detailed description of the various functions of the MAX Elite, see Sections 5 through 13. These instructions are compatible with the MAX Elite 1, MAX Elite 2, and MAX Elite 4 configurations.

The example will cover operation remaining in Channel 1 mode, however basic operation in the other channels, and in the dual-channel and multiple-channel mode, is similar.

1. Connect the detachable AC power cord to the provided power supply, attach the AC power cord to a grounded 120 VAC or 220/240 VAC 50/60 Hz power outlet, and connect the power supply to the MAX Elite **power adapter input**.
2. When the AC power cord is connected to the MAX Elite, the device will power on and the **Device On/Mains Power** Indicator LED will be green. The touchscreen will display the startup splash screen. (See Section 4 for more information about the startup splash screen.)

NOTE: To turn the device off, simply unplug the power cord or tap the power icon at the upper right corner of the screen, then press **Power Down**.

NOTE: To prolong the life of the device, always turn off all bias and allow time for bias to ramp down before unplugging the power cord.

3. Wait the recommended 60 seconds for the device to warm-up. To bypass the warm-up screen, tap the **Bypass Recommended Warm-up** button.
4. The Channel 1 measurement interface will appear after the warm-up period is complete or bypassed.
5. Select the desired range of operation, low or high, for Channel 1 by tapping on the pull-down menu under the *Range* header on the left side of the touchscreen. (See Section 6.2 for more information about selecting the range of measurement.)

NOTE: For best performance, select the lowest range possible for the intended measurement.

6. Tap the **Zero** button to perform the electrometer system zero adjustment. This will take up to approximately 30 seconds to complete. (See Section 6.7 for more information about performing a system zero.)
7. Connect an ionization chamber to the **measurement channel** labeled Channel 1 on the rear of the device.
8. Select the desired voltage bias by tapping the pull-down menu under the *Bias* header on the left side of the touchscreen. For best results, allow at least 10 minutes for the system to stabilize. (See Section 6.3 for more information about enabling and selecting bias voltage.)

NOTE: Depending on the type of measurements performed, leakage currents within a detector can be a significant portion of the measured data. Verify that the leakage of the detector is within the manufacturer's stated acceptable limits. The system zero can be adjusted to compensate for fixed leakage currents of the detector by tapping

the **Zero** button after the detector has been connected, bias has been applied (if appropriate), and the system has warmed up. (See Section 6.7 for more information about performing a system zero).

9. Tap the **Zero** button to perform the system zero adjustment, but now with the detector connected. This will take up to approximately 30 seconds to complete.
10. Check the system leakage. Take a reading without exposing the detector to radiation. This reading should be less than 0.1% of the final signal expected.
11. Measure the atmospheric temperature and pressure.
12. Optionally, a chamber coefficient/system factor can be applied automatically to an ionization chamber measurement to calculate dose or dose rate for single or two-channel measurements. Tap the checkbox next to **Apply System Factor** and select a chamber calibration factor to apply to each channel. If a system factor is not desired, skip to step 14. (See Section 6.4 for more information about applying a system factor.)

If the **Apply System Factor** box is checked, the following algorithm is used to calculate the dose or dose rate:

Dose or dose rate = $P_{elec}NM_{raw}$, where:

P_{elec} = Electrometer calibration factor, entered on the Calibration Tab within Preferences (see page 26). Note that P_{elec} should be set at the value of 1.000 if the electrometer and ion chamber are calibrated as a unit.

N = Ion chamber calibration coefficient, entered in the Detector Library (see page 29).

M_{raw} = Raw, uncorrected ion chamber reading.

NOTE: For a system factor to be applied, the chamber must first be set up within the Chamber Library (see Section 10), and it must have an active (not expired) calibration certificate.

NOTE: The system factor functionality is not available during four-channel mode measurements.

13. Tap the checkbox next to **Temperature/Pressure Correction** to enter values to correct the radiological measurements for temperature and pressure. Enter the appropriate temperature value and verify or edit the atmospheric pressure value. (See Section 6.5 for more information about temperature and pressure correction.) A small thermometer icon will display next to the corrected value.

NOTE: The Temperature and Pressure Correction can only be applied to a measurement if a system factor is also selected.

When the **Temperature/Pressure Correction** box is checked, the following algorithm is used to calculate the dose or dose rate.

Dose or dose rate = $P_{TP}P_{elec}NM_{raw}$, where:

P_{TP} = Temperature and pressure correction factor*

P_{elec} = Electrometer calibration factor, entered on the Calibration Tab within Preferences (see page 26). Note that P_{elec} should be set at the value of 1.000 if the electrometer and ion chamber are calibrated as a unit.

N = Ion chamber calibration coefficient, entered in the Chamber Library (see page 15)

M_{raw} = Raw, uncorrected ion chamber reading

*The following algorithm is used to calculate P_{TP} :

$$P_{TP} = ((273.15 + T(^{\circ}C)) / (273.15 + T_{ref})) \times (P_{ref} / P)$$

Where T = user-entered temperature value in degrees Celsius,

T_{ref} = 20°C or 22°C, whichever has been set in the Setup -> Electrometer -> Measurement preferences as the Temperature Standard,

P_{ref} = reference pressure, which is taken as 760 mmHg or 101.3 kPa, according to the Pressure Units that have been selected in the Setup -> Electrometer -> Measurement preferences, and

P = user-entered pressure, in the units displayed onscreen, which are the same units as P_{ref} .

NOTE: Calibration coefficients provided by an ADCL are corrected to standard temperature and pressure (In the US, this is 22 °C and 760 mmHg), and a correction for air density via a temperature/pressure correction must be applied to clinical measurements to obtain the correct dose, dose rate, or air kerma strength for the source.

NOTE: Temperature and pressure corrections are only applied to radiological units. They are not applied to electrical units.

14. Turn on or insert the radiation source(s) and take at least three measurements. To change from the default collection method, tap the pulldown box under the *Collection* heading on the left side of the touchscreen and select Continuous, Timed Collection, or Trigger Mode. (See Section 6.6 for more information about collection methods).

NOTE: Rate measurements above 1 μ A (High range) or 1 nA (Low range) will produce X's in place of measurement values signifying overload has occurred.

15. Analyze the data considering the average of the readings, system leakage, temperature/pressure corrections, calibration factors and any other appropriate corrections to be made.
16. When measurements are completed, turn off bias or set bias voltage to 0 VDC and select Apply.
17. If desired, disconnect the power supply from the device and disconnect the detachable AC power cord from the power supply. Disconnecting the power supply will turn the device off.

4 Turning the Device On/Startup Screen

To turn on the MAX Elite, simply connect the device to the provided AC power supply to the **power adaptor input** and plug the power supply into a grounded 120 VAC or 220/240 VAC 50/60 Hz power outlet. The **Device On/Main Powers Indicator** will turn green to signal the device is powered on and ready for use.

The initial screen displayed after turning on the device will be the startup screen, which will show the following:

- Software Version
- Firmware Version
- Device serial number
- A 60 second countdown for the recommended warm-up time.
- An optional **Bypass Recommended Warm-Up** button that may be tapped to bypass the recommended 60 second warmup.

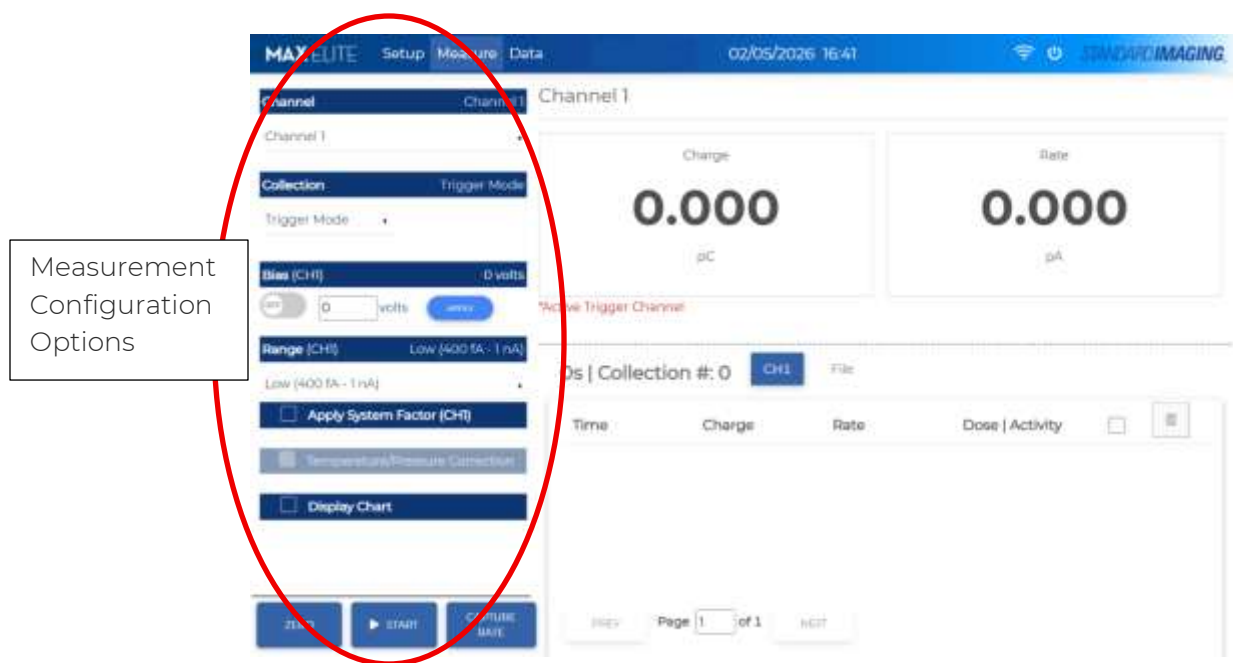


NOTE: If the screen is dark and the **Device On/Main Powers Indicator** is amber, the device is in sleep mode. Tap the screen to exit sleep mode and resume use.

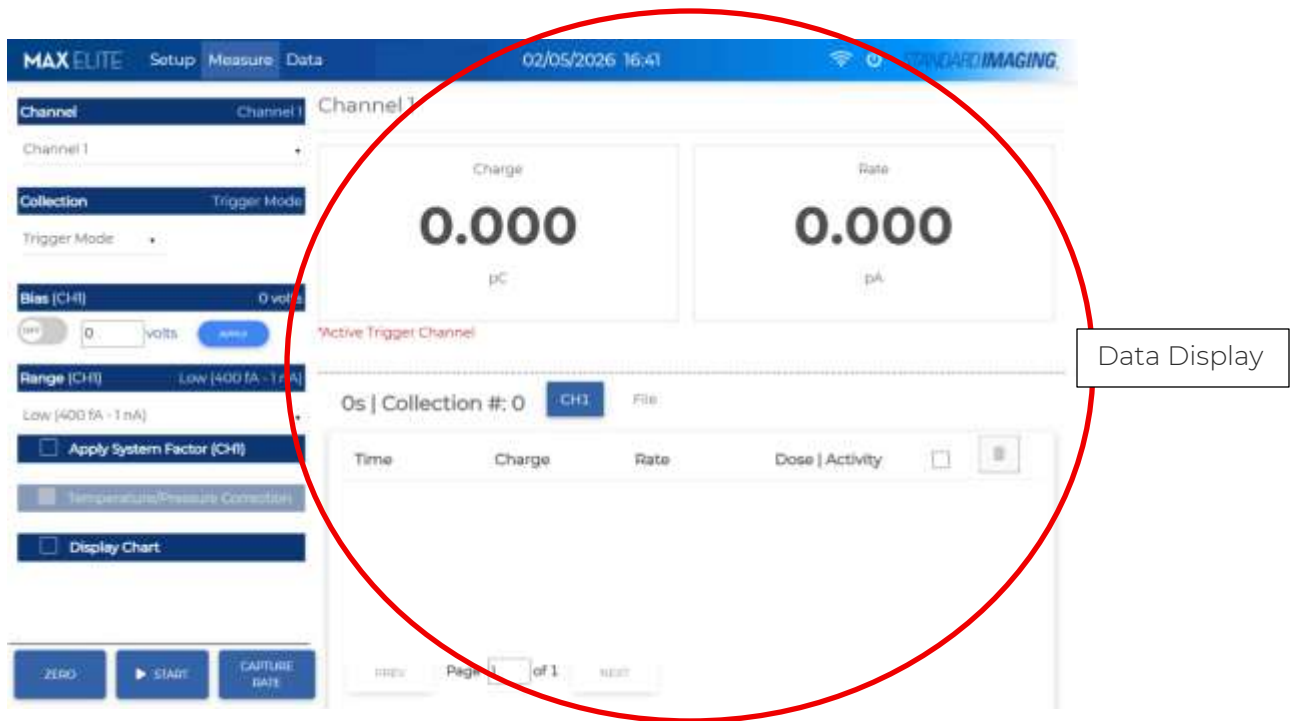
5 General Measurement Mode

After the recommended 60 second warmup is complete or bypassed, the touchscreen will display the Channel 1 interface on the *Measure Page*. The *Measure Page* has an interface that consists of two sections:

1. **Measurement Configuration Options:** The left side of the *Measure Page* displays the measurement configuration options divided into six headings: *Channel*, *Collection*, *Range*, *Bias*, *Apply System Factor*, *Temperature Pressure Correction*, and *Display Chart*. The **Zero**, **Start**, and **Capture Rate** buttons are at the bottom of this section.



2. **Data Display:** The right side of the *Measure Page* displays the current measurement data on the data display. The top portion of the data display shows the charge, rate, and dose for the current collection. The bottom portion shows recent collection data, including the time of collection and corresponding charge, rate, and dose. Data shown in this section are also automatically saved to the Data Table. (See Section 8 for more information about the Data Table.)



NOTE: To access the *Measure Page*, tap the **Measure** button on the menu at the top of the touchscreen.

NOTE: Navigating away from the *Measure Page* will clear the session data from the table on the *Measure* page. These data are still available on the *Data Page*.

The following two sections will explain how to use the MAX Elite as a general-purpose electrometer in the General Measurement Mode.

6 Measurement Configuration Options

6.1 Channel Selection



To select the channel(s) to be used for measurement, tap the drop-down menu under the *Channel* heading. The channels are available based on the configuration of the MAX Elite:

- In the MAX Elite 1 configuration: Channel 1 will appear.
- In the MAX Elite 2 configuration: Channel 1, Channel 2, and the 2-Channel Mode (Ch. 1&2) will appear.
- In the Max Elite 4 configuration: Channel 1, Channel 2, Channel 3, Channel 4, 2-Channel Mode (Ch 1&2), and 4-Channel Mode will appear.

The selected channel(s) will display on the *Channel* heading in white text.

6.2 Selecting the Range of Measurement



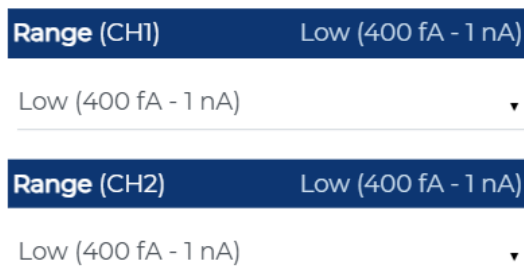
To select the range of measurement for a channel, tap on the drop-down menu under the *Range* heading. There are two range options:

- Low Range: 400 fA – 1 nA
- High Range: 400 pA – 1 μA

Tap the desired range, and the MAX Elite will automatically switch range modes. The selected range will display on the *Range* heading in white text.

NOTE: For best performance, select the lowest range possible for the intended measurement.

When in the 2-Channel Mode (Ch. 1&2), range can be set independently for each channel. To set the range, select from the drop-down menu for each channel:



In the 4-Channel Mode, the range and bias are identical for Channels 1 & 3 and for Channels 2 & 4.

NOTE: Each range of operation must be zeroed upon initial use. Tap the **Zero** button to perform a system zero. (See Section 6.7 for more information about performing a system zero.)

6.3 Enabling and Selecting Bias Voltage



Under the *Bias* heading, tap the box next to **volts** and a numeric keypad will display allowing the operator to enter voltage in one volt increments from ± 10 -1000 V. (For the MAX Elite 1, this range is ± 10 -450 V.) Enter the desired voltage and tap **Enter** to proceed. Alternately, select between the three discreet preset bias settings on the keypad: 150, 300 or 450 V. To change between a positive and negative value, simply press the +/- symbol on the keypad. Press **Apply** to save the voltage setting.

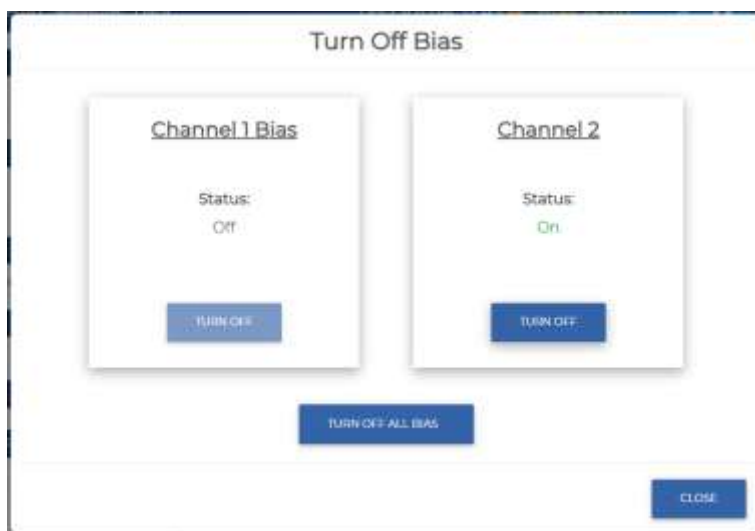
Slide the toggle to **On** to turn on the bias.

In the 2-Channel Mode (Ch. 1&2), bias can be set independently for each channel.

In the 4-Channel Mode, the bias is identical for Channels 1 & 3 and for Channels 2 & 4.



When bias is turned on for any channel, an indication is displayed at the top of the screen. To turn off bias from any screen on the MAX Elite, tap on **Bias is on**.



A screen will be displayed showing which channels have bias applied, and the option is provided to turn off bias to individual channels or to all channels simultaneously. Press **Close** to close the screen without turning off bias.

NOTE: Bias rampdown requires a few moments. The *Bias is On* indicator will remain onscreen until bias is fully off.

6.4 Apply System Factor

✓ Apply System Factor (Ch 1)		
Chamber Name	Report Name	Calibration Factor
A30	AB98765	2.976×10^9 N ₂ :Gy/C
A26	EX12345	2.16×10^{11} N ₂ :R/C
A12	DW5656	4.87×10^7

Tap the box next to **Apply System Factor** to display the available chambers. Tap on the desired chamber to view the Chamber Name, Report Name, and Calibration Date. Tapping on a chamber will also apply the chamber's system factor to the selected channel.

NOTE: A chamber must be entered into the Chamber Library and have a valid (not expired) calibration factor in order to apply a system factor. For an explanation of the Chamber Library interface, see Section 10.

NOTE: This feature is not available for the 4-channel mode of the MAX Elite 4.

Depending on the type of system factor selected, the additional row label and accompanying unit will vary. Derived dose and exposure values will only display the default system factor unit.

6.5 Temperature/Pressure Correction

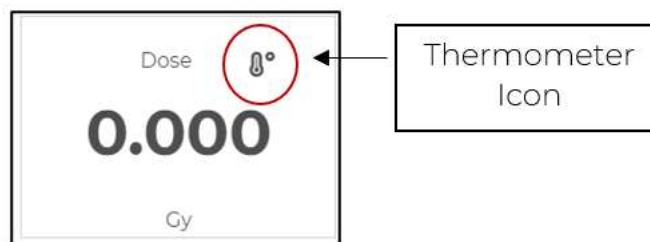
✓ Temperature/Pressure Correction	
Temperature:	22.4 °C
Pressure:	736.69 mmHg
APPLY	

After applying a system factor, tap the box next to **Temperature/Pressure Correction** located in the Measurement Configuration Options to display fields for entering temperature (degrees Celsius) and pressure (mmHg or kPa; see Section 13.6 for setting a preference). These values will be used to calculate the Temperature/Pressure correction for the selected channel(s).

The Pressure value will be filled in automatically according to the sensor that is built into the MAX Elite. To override this value, simply tap on the number and enter a new value.

After entering a value from the numeric keypad, tap **Close** to close the keypad. Tap the **Apply** button to save the values.

To modify an existing value, tap on the number shown to display the numeric keypad. Enter the modified value and tap **Close** to close the keypad. Tap the **Apply** button after entering the modified information.



When a temperature and pressure correction is applied, a thermometer icon will be displayed in the dose field within the data display.

NOTE: Temperature and pressure correction is only applied to radiological units. It is not applied to electrical units.

NOTE: The MAX Elite does not automatically measure ambient temperature, nor does it display a prompt to verify if temperature and pressure values have changed during a set of measurements, so ensuring entered values are correct for the entire duration of measurement is recommended. If temperature or pressure values shift over time, adjust the values as described above.

6.6 Collection Modes



In the *Collection* heading, tap on the pulldown menu to display the three options for the charge collection: Continuous, Timed Collection, and Trigger Mode. Simply tap to select the desired collection mode.

1. Continuous: This mode will collect continuous measurement data until the operator stops the collection.
 - o When selected, 0 sec will be displayed above the data table.
 - o Tap the **Start** button to begin a charge collection. The timer above the data table will count up, and accumulated charge collection will be displayed.
 - o Tap the **Stop** button to end the collection.
 - o Upon completion of the charge collection, the measured charge will remain onscreen and the **Start** button will change to **Clear**. Tapping the **Clear** button will

reset the charge value to zero in preparation for the start of the next charge collection.

2. **Timed Collection:** This mode allows the operator to set values for the time and number of collections.
 - When selected, a numeric keypad will appear allowing the operator to enter values for time and the number of collections.
 - Tap the box next to **Seconds** to display the numeric keyboard; simply enter a time duration in one second increments from one to 86,400 seconds (1 day).
 - Then tap the box next to **Collections** and enter the number of collections on the numeric keyboard.
 - Tap **Close** to save the information and tap the **Start** button to begin the charge collection. The elapsed time for the active collection and the collection number will be displayed above the data table.
 - During collections, the **Start** button will change to **Stop**. Tap the **Stop** button to end the collection(s) prematurely.
 - Upon completion of the charge collection, the **Stop** button will change to **Clear**. Tapping the **Clear** button will reset the charge value to zero before allowing the start of the next charge collection.
 - To modify an existing value for the timed collection duration or number of collections, tap on the number to display the numeric keypad. Enter the modified value and tap **Close**. Then tap the **Start** button to perform a charge collection for the duration/series entered.

NOTE: To prevent exceeding the available memory in MAX Elite, do not set the number of collections to more than 2,500.

Collection	Timed Collection
Timed Collection ▼	10 Seconds
	5 Collections

3. **Trigger Mode:** This mode allows the MAX Elite to detect the start and stop of a radiation exposure automatically.
 - When Trigger Mode is selected, tap the **Start** button to ready the electrometer for measurement. The button will now say **Armed**.
 - When the signal exceeds the Trigger Start value (set in Preferences, see Section 13.6) charge collection will begin, and the **Armed** button will now say **Stop**. When the signal drops below the Trigger Stop value (set in Preferences, see Section 13.6) charge collection will end.
 - After a triggered measurement is completed, the MAX Elite will return to the Armed state.
 - Tap the **Stop** button to end a collection prematurely and disarm the Trigger Mode.
 - Tap the **Armed** button to disarm the Trigger Mode.

NOTE: Triggered measurements for all displayed channels will be collected simultaneously based on the signal and trigger values of the Trigger Control Channel selected in the *Setup -> Electrometer -> Trigger Values* page. For instance, if Channel 2 is set as the Trigger Control Channel, triggered measurements for all displayed channels will be collected when Channel 2 passes its trigger thresholds.

When any charge collection is completed, the measured value is placed in the Data Table for future data export (See Section 8).

NOTE: When in a multiple-channel mode, charge collection is synchronized for all channels. However, resulting measurement values are kept separate.

6.7 Display Chart

☒ Display Chart

The two- and four-channel configurations of the MAX Elite include a live data plotting feature. If the *Display Chart* option is selected, the right-hand side of the screen will display a time resolved plot of the data collection sampled at 0.1 second intervals for up to 2 minutes of data samples.



Data will be plotted only during active measurements.

- For Continuous measurements, data will be plotted as soon as **Start** has been pressed and will continue until **Stop** is pressed or two minutes have passed. For measurements less than two minutes in duration, additional measurement data will be appended to

the plot after **Clear** and **Start** have been pressed, until the two-minute maximum has been reached.

- For Timed measurements, data will be plotted as soon as **Start** has been pressed and will continue until timed measurements are ended or two minutes have passed. For multiple timed measurements, data will be appended to the plot until the two-minute maximum has been reached.
- For Trigger Mode measurements, data will be plotted beginning when a measurement is triggered and continuing until the measurement ends or two minutes have passed. For multiple triggered measurements, data will be appended to the plot each time a new triggered measurement begins until the two-minute maximum has been reached.

NOTE: Pressing **Clear** at the end of the measurement will clear the integrated measurement display that is hidden behind the live plot, preparing the system for the next measurement. The **Clear** button will not clear the data from the live plot. If you wish to view this integrated value, first save the plot image or download plot data if desired, then deselect the *Display Chart* option.

NOTE: Plotted time-resolved data are not saved to the MAX Elite database and therefore will not be retrievable once the plot has been cleared or closed. Integrated measurements are saved, however.

NOTE: Measurements will be completed and integrated data will be saved to the database even if the measurement extends beyond the data plot's two-minute maximum.

Display settings are shown above the plot.

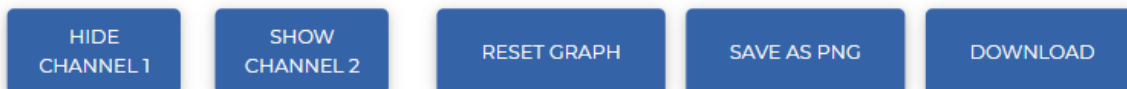


Data display can be set to either rate or charge mode. Changing the display mode will reset the plot.

If the plot is set to **Auto Scale**, the Time axis will start at 1.0 seconds and expand to encompass the duration of the measured data, up to two minutes. If a fixed time range is desired for the plot, select **Fixed Range** and set the desired display window.

To zoom in on a section of the plot, select **Zoom** and enter the time range you wish to view. The y-axis will automatically scale based on the measurements displayed. To shift the window left or right either in the *Fixed Range* view or the zoomed view, press **Pan Left** or **Pan Right**. To reset the view, select **Reset Zoom**.

Additional display options and information download selections are shown below the plot:



By default, the active channel or channels selected in the *Channel* setting will be actively displayed on the plot. To display or hide individual channels, press the **Hide** or **Show** buttons for those channels.

To clear the plot of all data, press **Reset Graph**.

To save an image of the plot to a USB drive or to download it from a remote browser, press **Save as PNG**. To save or download a .csv file that includes all data points in the plot, press **Download**.

NOTE: Plotted time-resolved data are not saved to the MAX Elite database and therefore will not be retrievable once the plot has been cleared or closed.

6.8 Performing a System Zero



Tap the **Zero** button to perform a system zero on the channel being displayed. Always perform a system zero when switching range and after connecting a detector to the electrometer.

6.9 Start Collection/Stop Collection/System Clear



To begin taking measurement collections in the continuous collection mode, timed collection mode, or the trigger mode, simply tap the **Start** button. After tapping the **Start** button, the button will change to a **Stop** or **Armed** button.

To stop taking measurement collections in the continuous collection, tap on the **Stop** button. In the timed collection mode, tapping the **Stop** button will end data collection early. In the trigger collection mode, tapping the **Stop** button will end data collection early and disarm the trigger mode.

After stopping collections in the continuous collection mode or the timed collection mode, the **Start** button will change to **Clear**. Tapping the **Clear** button will reset the charge value and change the button to **Start** in preparation for the next charge collection.

6.10 Capture Rate



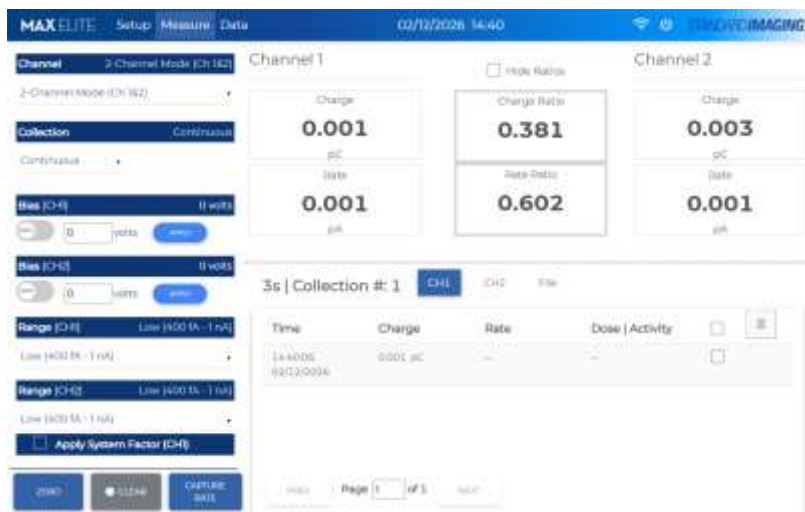
To record the actively displayed rate value, simply tap the **Capture Rate** button. If the Rate Averaging feature has been turned on, a count-up timer will be displayed above the data table, and measurements will not be saved to the data table until the set averaging time has been reached.

7 Display Data

7.1 Charge/Rate/Dose

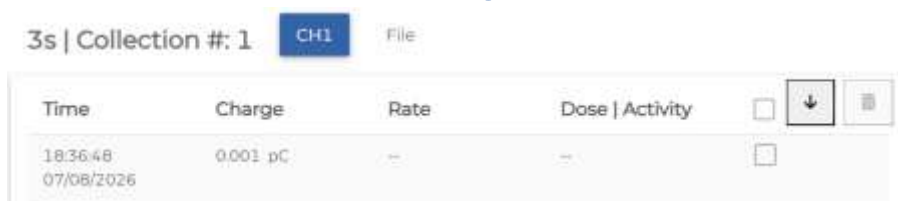
The top portion of the data display shows the charge, rate, and dose for the current collection.

7.2 Display Ratios

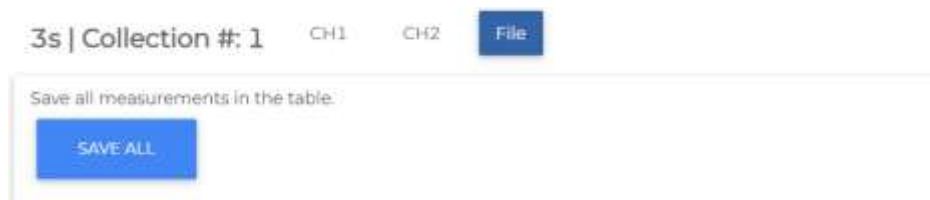


When using the dual-channel Mode, ratio readings (Channel 1 divided by Channel 2) are shown in a third column centered between the Channel 1 and Channel 2 readings on the data display. To hide this column, simply click the checkbox next to *Hide Ratios*.

7.3 Measurement Information and Saving Session Data



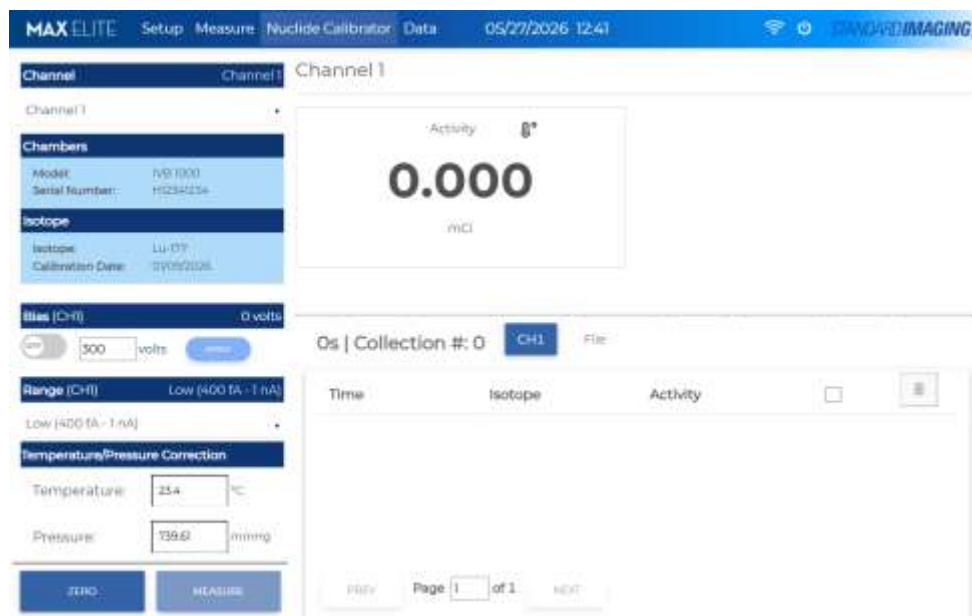
The bottom portion of the display data shows recent collection data, including the time of collection and corresponding charge, rate, and dose or activity. A data sorting arrow button allows the data to be displayed in descending or ascending order by time and date of collection. Although this table will be cleared whenever the electrometer is powered off, all measurements are also saved to the Data tab.



To export the session data in .csv format to a USB device, select **Save All**. With the MAX Elite 2 or MAX Elite 4 configurations, selecting **Save All** from a remote browser session will download the file directly to your computer.

8 Nuclide Calibrator Page

The optional Nuclide Calibrator Page is a simplified version of the Measure page tailored specifically to Theranostics radionuclide calibration measurements using the IVB 1000 well chamber.

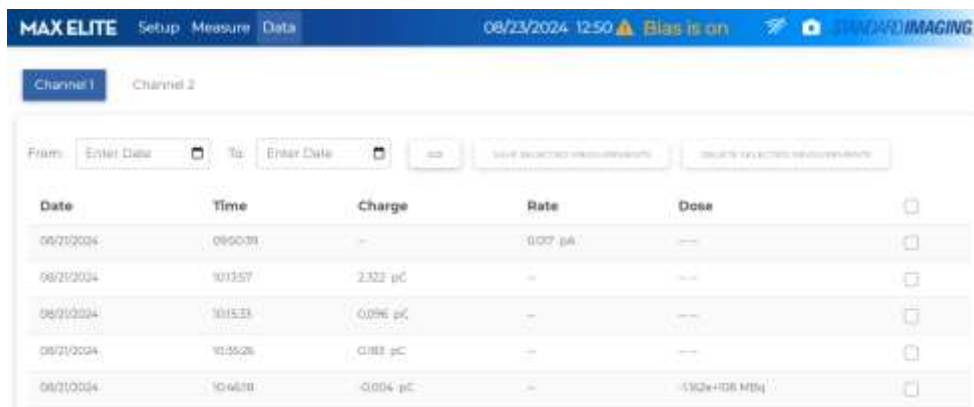


The left side of the page shows the measurement configuration options. These are similar to what is shown on the general Measure page, with a few key differences:

- Only a single channel may be selected.
- System factors must be applied, so chamber and isotope calibration selections are required for measurements.

- o Note: Only chambers with serial numbers starting with H will be displayed. If only a single chamber with an appropriate serial number exists in the detector library, it will be selected by default.
- o Only unexpired calibrations with activity units will be displayed. If only one qualifying calibration exists for the selected well chamber, it will be selected by default.
- o Bias setting will default to 300V. Bias must be turned on before measurements can be made.
- o Select the appropriate range for the expected measurement signal.
- o The Temperature and Pressure correction is required. The system will automatically fill in the pressure value based on its internal sensors. The temperature value must be entered by the user. Once the temperature and pressure are entered, scroll down and press **Apply**. A thermometer icon will be displayed in the Activity display when this correction is being applied.
- o Once all of these steps have been completed, the **Measure** button will become active.
- o Zero the electrometer to remove background signal.
- o Place the radioactive source into the IVB 1000 well chamber and wait for signal to stabilize.
- o Press **Measure** to save the measured activity to the data table. If the Rate Averaging feature has been turned on, a count-up timer will be displayed above the data table, and measurements will not be saved to the data table until the set averaging time has been reached.

9 The Data Table



The screenshot shows the MAX ELITE software interface. At the top, there's a blue header bar with 'MAX ELITE' on the left, 'Setup Measure Data' in the center, and a timestamp '08/23/2024 12:50' along with 'Bias is on' and a 'START/STOP IMAGING' button on the right. Below the header, there are two tabs: 'Channel 1' (selected) and 'Channel 2'. Under the 'Channel 1' tab, there's a section for 'From' and 'To' date selection, and two buttons: 'Save the data to the data table' and 'Export the data to the data table'. Below this is a table with the following data:

Date	Time	Charge	Rate	Dose
08/21/2024	09:50:38	—	0.007 pA	—
08/21/2024	10:13:57	2.322 pC	—	—
08/21/2024	10:15:33	0.096 pC	—	—
08/21/2024	10:35:26	0.082 pC	—	—
08/21/2024	10:46:00	0.004 pC	—	1.502e+008 MBq

To view the list of all saved measurements, tap the **Data** button in the menu at the top of the touchscreen display to go to the *Data Page*. This list displayed on the *Data Page* is called the Data Table and can be exported from the MAX Elite to a USB device in .csv format. With the MAX Elite 2 and MAX Elite 4 configurations, the Data Table can also be downloaded.

The default information displayed on the Data Page is the measurement information for Channel 1. To view the Data Page for a different channel or scintillator, simply tap on the desired option at the top of the page. The selected option will be highlighted in blue for easy reference.

To select individual data points for export, select points or data pages individually, or use the **Select All** button to select all data for the displayed channel. Multiple channel data can be exported by first selecting data from one channel, then selecting an additional channel and selecting data from that channel.

The Data Table contains the following measurement information as appropriate for the type of measurement that was collected:

- The date of collection,
- The time of collection,
- The charge of the collection,
- The rate of the collection
- The dose or dose rate of the collection

Whenever a charge collection (timed, continuous, or trigger) is completed, the resulting charge and/or dose measurement value is automatically added to the Data Table.

Individual data points may be removed from the table by selecting the checkbox and choosing **Delete Selected Measurements**. To delete all data for a given channel, use the **Select All** button and then press **Delete Selected Measurements**.

NOTE: To prevent exceeding the available memory in MAX Elite, do not record more than 2,500 measurements to the Data Table.

9.1 Saving Measurement Data

The Data tab allows for the export of measurement data that appear in the Data Table. Select the measurements you wish to save. Connect a USB flash drive with appropriate formatting (FAT or FAT32 file systems) to the USB port on the rear panel of the device. Select the measurements you wish to export and tap the **Save Selected Measurements** button. A confirmation dialog will appear if the file is saved successfully.

With the MAX Elite 2 or MAX Elite 4 configurations, selecting **Save Selected Measurements** from a remote browser session will download the .csv file directly to your computer.

For any issues using a USB flash drive, see the Troubleshooting section of this manual.

NOTE: Data for each channel must be selected individually or by using the **Select All** button when that channel's data table is displayed.

For an explanation of the exported file format, see page 55.

10 Detector Library

The Detector Library allows for adding system factors by way of chamber calibration data into the MAX Elite interface. Most types of ionization or well chambers can be used, and multiple calibrations for individual chambers can be entered for added flexibility.

To access the Detector Library, tap the **Setup** button in the menu at the top of the touchscreen to go to the *Setup Page*. Then tap the **Detectors** button.

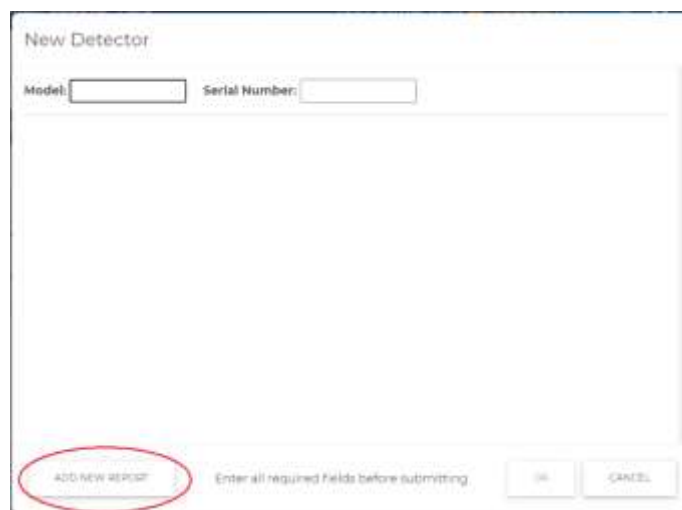


This section of the user manual covers adding, editing, and deleting detectors within the Detector Library interface.

10.1 Adding a New Detector



Tap the **New** button to display a screen to add a detector to the Detector Library. A user interface will appear on the touchscreen to enter the detector model and serial number information. To enter calibration information at the same time, tap **Add New Report** at the bottom of the popup screen. Calibration reports may also be added after the new detector is saved to the detector library.



First, enter the detector model and serial number. Tap each entry box to display a keyboard to enter the information.

If **Add New Report** was selected, enter the calibration report name or number listed on the calibration document and the date of the report. When entering the report date, the date selection tool shown below will be displayed.

Once the report date is entered, the calibration due date is automatically filled in, with a date two years following the report date. This value can be changed by clicking on the calibration due date field, but ionization or well chamber calibration is recommended every two years by the AAPM TG-51 protocol.

If a chamber is within 60 days of needing a calibration, an icon (⚠️) will show next to the chamber name on the main chamber library screen. If a calibration date is past due, a warning icon will appear. Hovering over the icon will say in text that the calibration is past due.

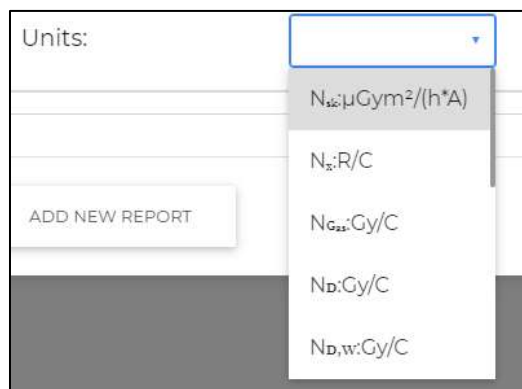


Next, enter the chamber calibration information. Beam/Isotope, Aion and polarity values from the calibration report will not be applied to the calculated system factor. These factors are

included for informational purposes only. It is the responsibility of the user to measure and apply Aion and polarity correction factors appropriate at the time of measurement.

The calibration coefficient and units are required for the calculation of the system factor.

All values are entered with the on-screen keypad except for units, which is selected from a pre-set list of options via a pull-down menu as shown below.



Verify that the selected default units match the reported units of the calibration factor and adjust the exponent if needed.

When all the fields are complete, the user can add another calibration for the new detector by tapping the **Add New Report** button at the bottom left of the interface. To finish and save the detector to the detector library, tap the **Ok** button. Tap the **Cancel** button to discard the information.

If your calibration has been provided with an appropriate data matrix, the detector and calibration information may also be entered using the Data Matrix functionality described in Section 11.

NOTE: Only non-expired calibration factors will be displayed in the *Apply System Factor* dialog on the *Measure* page.

10.2 Editing an Existing Detector/Calibration



To edit an existing detector or calibration, tap on the existing detector in the Detector Library. Then tap the **Edit** button at the top of the screen.

An interface identical to the New Detector interface (see Section 10.1) will appear with all detector and calibration parameters filled in:

1. Tap on the desired parameters to change and a touchpad will appear.
2. Enter the replacement values.
3. Once completed, tap the **Ok** button.
4. Tap the **Cancel** button to discard changes.
5. The detector and calibration information will be saved to the Detector Library.

10.3 Adding a Calibration to an Existing Detector

To add a calibration to an existing detector, tap on the existing detector in the Detector Library. Then tap the **Add Calibration** button at the top of the screen.

An interface identical to the New Detector interface (see Section 10.1) will appear.

1. Tap on each field to enter the relevant information.
2. Once completed, tap the **Ok** button.
3. Tap the **Cancel** button to discard changes.
4. The detector and calibration information will be saved to the Detector Library.

10.4 Deleting an Existing Detector/Calibration

To delete a detector or calibration, tap on the detector or calibration from the Detector Library and tap the **Delete** button. A prompt will appear to confirm this operation.

11 Data Matrix Entry of Calibration Data

The MAX Elite 2 and MAX Elite 4 electrometer configurations both include a data matrix scanner for automatic entry of detector calibration information. The steps for using this function are described below.

1. Select the camera icon at the top of the screen.
2. Select **Start** to turn on the camera.
3. If required, select **Allow** to enable the system to use the camera.
4. Hold your calibration data matrix in front of the camera.
5. When the system recognizes the matrix code, a Detector Calibration dialog will appear with data fields pre-populated based on the information included in the data matrix. You may select whether to save, edit, or discard the calibration.

12 Check Sources

The Check Source feature is a simple utility for creating a source database and calculating the projected activity of a radiation source. This utility is separate from the measurement and chamber library modes within the MAX Elite.

The Check Source feature is accessed through the *Setup* page. To access the Check Source feature, tap the **Setup** button in the menu at the top of the touchscreen display to get to the *Setup* page. Then tap the **Check Sources** button.

Serial Number	Name	Starting Activity	Current Activity
SP12345	Strontium check source	20 mCi	15.83 mCi
54321	Cobalt	1000 mCi	552.27 mCi

The following sections of the manual cover adding, editing, and deleting sources and calculating the projected activity of radiation sources.

12.1 Adding a New Source



Tap the **Add** button to display the Create New Source interface. Complete the fields on this form to add a new source to the Check Source database.

The Serial Number, Source Name, Half-Life, and Starting Activity are all entered via an on-screen keypad while Units (kBq, MBq, μ C, mCi) are entered via a pull-down menu and Starting Date is selected with the date selection tool.

Units:

Starting Date:

Dropdown menu options: Ci, μ Ci, mCi, kBq, MBq

Starting Date:

Enter Date

Calendar: January 2023

Selected date: 24

The values in this form are the basis for the projected activity calculation. When completed, tap **OK** and the new source is added to the Check Source database.

12.2 Editing an Existing Source

ADD EDIT DELETE

To edit an existing source, select the source from the Check Source main screen and tap the **Edit** button. Make any desired changes and tap the **OK** button to save the changes to the database.

12.3 Calculating Projected Activity

Serial Number	Name	Starting Activity	Current Activity
SR12345	Strontium check source	20 mCi	15.83 mCi
54321	Cobalt	1000 mCi	552.27 mCi

Name	Half-Life	Units	Activity	Date
Cobalt	5.27	mCi	Starting: 1,000.00 mCi	08/10/2021
			Current: 552.27 mCi	02/12/2026
			Projected: Enter date for projected activity	Enter Date:

To calculate a source's projected activity, select the source from the Check Source main screen. The source parameters are displayed underneath the selected source. Both the initial activity and current activity will be displayed. To select an alternate date for activity calculation, press the Enter Date field or the calendar icon and the date selection tool is displayed.



The activity value can be calculated to either a future or past date. Enter the desired date and the projected activity is displayed under the Activity column.

	Activity	Date
Starting	1,000.00 mCi	08/10/2021
Current	552.27 mCi	02/12/2026
Projected	565.30 mCi	12/10/2025

NOTE: The calculated activity value is only displayed for reference and is not saved.

NOTE: The following algorithm is used to calculate the activity of a check source:

$A = A_0 e^{-\lambda t}$, where:

$A =$ Activity on chosen date

$A_0 =$ The original activity of the check source on the reference date

L = (0.693/half-life of the isotope in years)

t = Elapsed time, in years, between the reference date and the current or projected date

12.4 Deleting an Existing Source

To delete a source, select the source from the Check Source main screen and tap **Delete**.

13 Preferences

13.1 General Device Preferences

To access and change the general device preferences for display brightness, volume, and date/time format, tap the **Setup** button in the main menu at the top of the touchscreen to go to the *Setup Page*. Then tap the **Preferences** button.

Screen Saver Setting

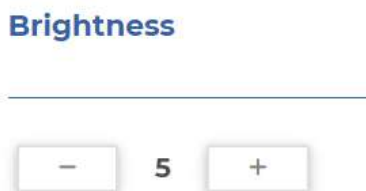
Lower Brightness After

To save energy and preserve screen life, the MAX Elite will dim the screen after a preset length of time with no activity. To change this preset time, select the desired delay from the dropdown

list. To prevent the unit from entering screen saver mode, select *Never* from the dropdown. Press **Save Changes** to implement the new preference setting.

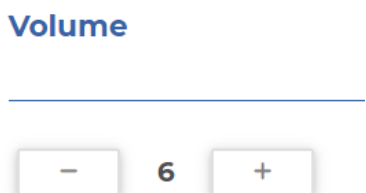
When the system is in screensaver mode, tap the screen to restore display brightness to its active setting.

Display Brightness



Tap the **negative** (-) and **positive** (+) buttons to adjust the display from dimmer (lower number) to brighter (higher number).

Sound Volume



Tap the **negative** (-) and **positive** (+) buttons to adjust the sound volume from softer (lower number) to louder (higher number). A sound will play upon each change to signify the new volume level. To mute all sound, set Volume control to zero.

Language



To change the displayed language, select from the available languages in the drop-down list. Select **Save Changes** to apply your selection. The system will then restart at the warmup screen.

Setting Date and Time

Date/Time Format

Time Zone

(UTC-06:00) Central Time (US & Canada) ▼

Date **Time**

☒ MM/DD/YYYY ☒ 10:26

☐ DD/MM/YYYY ☐ 10:26 AM

☐ YYYY/MM/DD

SAVE CHANGES

Manually Set Date/Time ☐

Select the desired time zone from the drop-down list.

Select the desired date format by tapping the radio button adjacent to either MM/DD/YYYY (Month/Day/Year), DD/MM/YYYY (Day/Month/Year), or YYYY/MM/DD (Year/Month/Day).

Select the desired time format by tapping the radio button adjacent to either the 12-Hour Format or 24-Hour Format.

Tap the **Set Date/Time** button to complete the change.

The MAX Elite will automatically adjust the date and time when it connects to an appropriate wireless network. To set the date and time manually, select the toggle button next to *Manually Set Date/Time*. Select the date and time from the calendar tool, and then select **Set Date/Time** to apply your setting. To revert to an automatic date/time setting, turn off the toggle button next to *Manually Set Date/Time*.

Nuclide Calibrator Page

Nuclide Calibrator Page

Show Nuclide Calibrator Page ☐

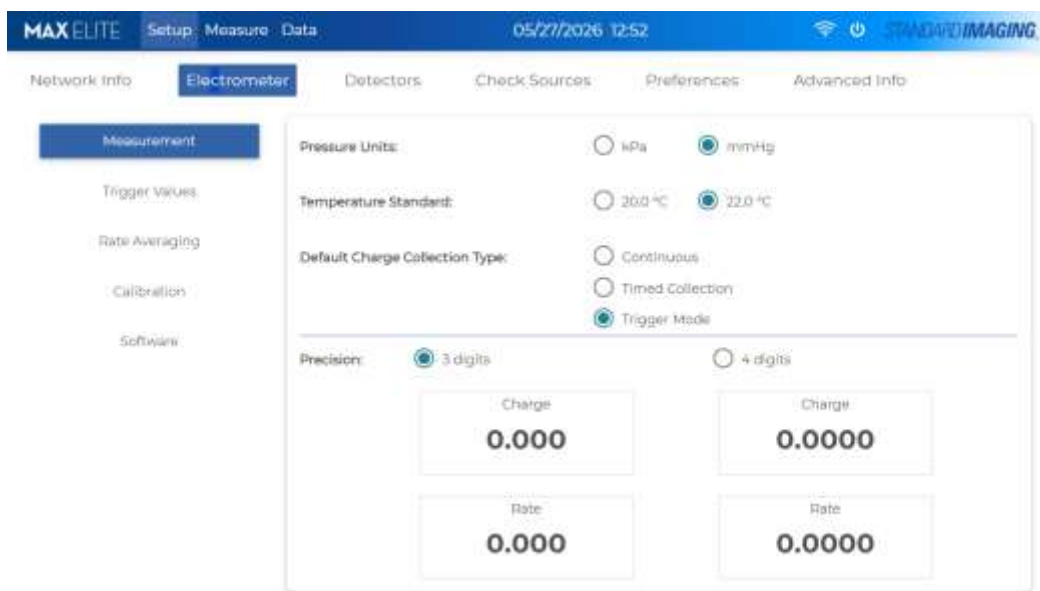
Set as Default Startup Page ☐

The measurement page tailored for Nuclear Medicine radionuclide calibration measurements with the HDR 1000 well chamber can be displayed by selecting the toggle button next to *Show Nuclide Calibrator Page*.

If you wish to have this page be shown by default after the warmup countdown has completed or Bypass Warmup is selected on the startup screen, select the toggle button next to *Set as*

Default Startup Page. This option is only available if the *Show Nuclide Calibrator Page* option is turned on.

13.2 Electrometer Measurement Preferences



To set the measurement preferences for the electrometer, go to the *Setup Page* by tapping the **Setup** button in the menu at the top of the touchscreen and then tap the **Electrometer** button.

Set Pressure Units

The default pressure unit is kPa. To switch between KPa and mmHg tap the radio button next to desired unit.

Set Temperature Standard

Select the appropriate reference temperature to be used in the Temperature and Pressure correction. This should match the reference temperature cited in your detector calibration reports. To switch between 20.0 degrees C and 22.0 degrees C, tap the radio button next to the desired temperature.

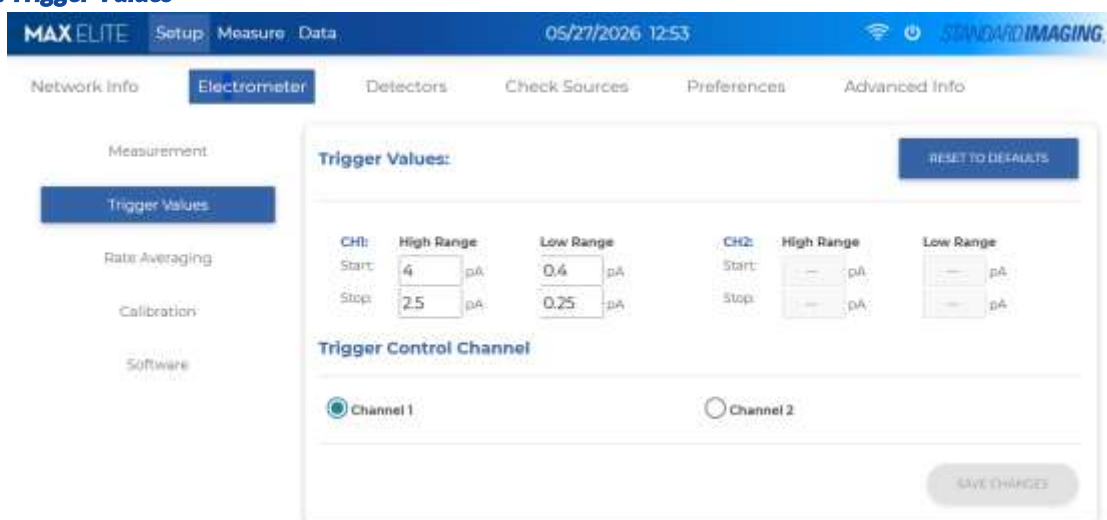
Set Default Charge Collection Type

The default charge collection type is Continuous. To change the default to Timed Collection or Trigger Mode, tap the radio button next to the appropriate selection.

Set Display Precision

For MAX Elite electrometers with two or four channels, a display precision option is available. Select the measurement display precision you prefer to see onscreen. Note that saved data for all measurements retain the maximum precision regardless of display settings.

Set Trigger Values



The screenshot shows the MAX ELITE Electrometer Setup page. The top navigation bar includes 'MAX ELITE', 'Setup', 'Measure', and 'Data'. The date and time are 05/27/2026 12:53. The 'Setup' tab is active, and the 'Electrometer' sub-tab is selected. The left sidebar shows 'Measurement' as the main category, with 'Trigger Values' highlighted. Other options in the sidebar include 'Rate Averaging', 'Calibration', and 'Software'. The main content area is titled 'Trigger Values:' and includes a 'RESET TO DEFAULTS' button. It displays settings for two channels, CH1 and CH2, each with 'High Range' and 'Low Range' options. For CH1, the High Range Start is 4 pA and Stop is 2.5 pA. For CH2, the High Range Start and Stop are both set to dashes. The 'Trigger Control Channel' section shows 'Channel 1' selected with a radio button. A 'SAVE CHANGES' button is at the bottom right.

Channel	Range	Start (pA)	Stop (pA)
CH1	High Range	4	2.5
	Low Range	0.4	0.25
CH2	High Range	—	—
	Low Range	—	—

Trigger Control Channel: ☒ Channel 1 ☐ Channel 2

For multi-channel devices, select the Trigger Control Channel. Measurements will be triggered based on the signal from this channel, but signal from all channels selected in the measurement mode will be collected simultaneously.

NOTE: The Trigger Control Channel must be one of the channels selected in your measurement mode setting on the *Measure* page in order for a triggered collection to be acquired. For example, if Channel 2 is set as the Trigger Control Channel, triggered measurements cannot be made using only Channel 1.

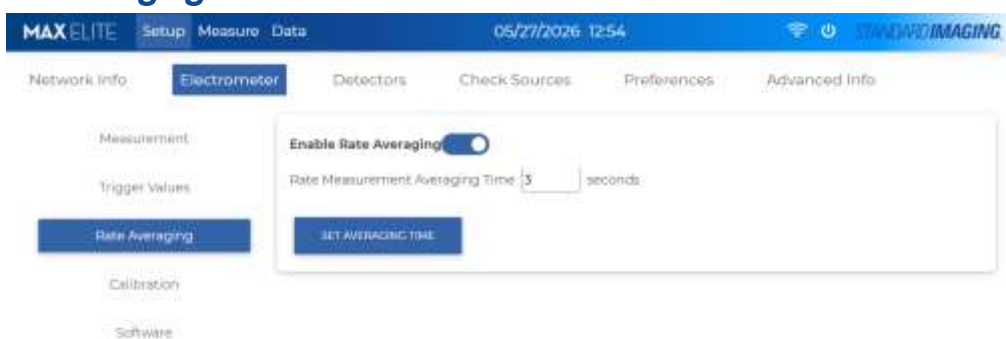
Trigger values are adjustable for both the high and low range. The default settings are Start 4.0 pA and Stop 2.5 pA for high range and Start 0.4 pA and Stop 0.25 pA for low range. These values are adjustable from 1 pA to 10 nA for High range and 10 fA to 1 nA for Low range. Tap the Start or Stop value to edit each independently. Trigger values must be larger than 0.0, and the Start value must be larger than the Stop value.

When making measurements in the presence of larger leakage currents, it may be necessary to raise the trigger values. Conversely, since the start trigger value determines the minimum dose rate required to start a charge collection, it may be necessary to lower the trigger value for other measurements.

To return all trigger settings to factory defaults, press **Reset to Defaults**, then press **Save Changes**.

NOTE: Charge measurements made in modes or with settings other than those used by the calibration agency may result in measurement errors that exceed the calibration uncertainty.

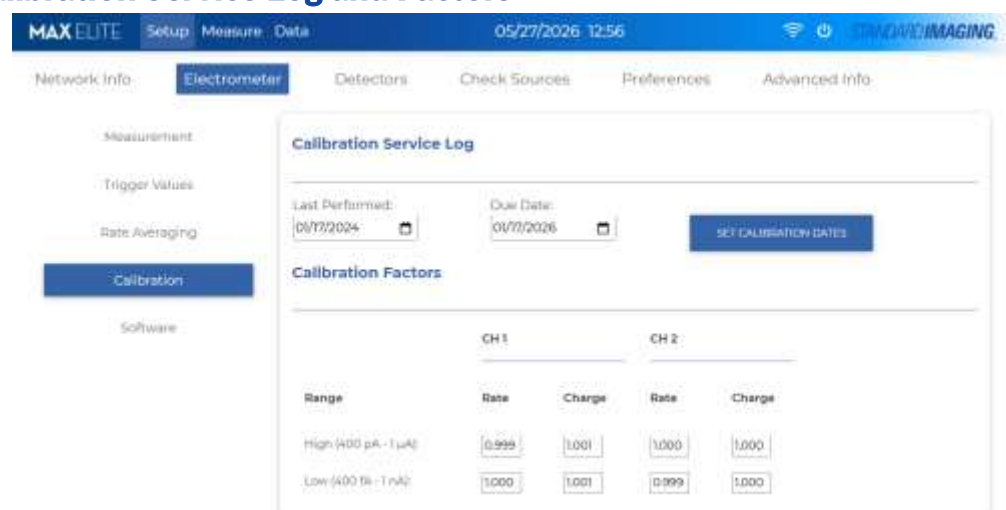
13.3 Rate Averaging



An optional Rate Averaging setting is provided. To turn this feature on, select the toggle switch next to *Enable Rate Averaging*. Enter your desired averaging time between 1 and 15 seconds, and press **Set Averaging Time**.

When this feature is turned on, pressing the **Capture Rate** button on the Measure page or the **Measure** button on the Nuclide Calibrator page will display a time counter above the data table, and the average rate value from the selected time interval will be recorded in the data table after the set averaging time has been reached.

13.4 Calibration Service Log and Factors



To view and edit the calibration service log and calibration factors, go to the *Setup Page* by tapping the **Setup** button in the menu at the top of the touchscreen and then tap the **Electrometer** button and the **Calibration** button.

Calibration Service Log

The calibration service log values can be entered from a calibration report for quick reference. Tap in the **Last Performed** box to display the calendar selector and tap on the appropriate date.

Last Performed:

09/09/2019

September 2019

S	M	T	W	T	F	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30					

Calibration Factors

Calibration factor values received from a calibration agency for Channel 1 and 2, high range and low range can be entered here for added computational convenience.

NOTE: These factors are only applied to system factor corrected measurements, i.e., dose and dose rate. See Section 6.4 to learn more about applying a system factor. Electrical measurements, i.e., rate and charge, are always displayed as raw values and are not affected by these factors.

The default setting is 1.000 for each calibration factor. When the values are set to 1.000, essentially no factor is applied. Tap each value to enter it with the on-screen keypad.

For reference, the terminology used to develop the nomenclature within the MAX Elite software is based on ICRU Report No. 76: Indication (of a measuring instrument) is the value of the quantity provided by a measuring instrument.

NOTE: The value read from the displaying device can be called the direct indication; it is multiplied by the instrument constant to give the indication. The quantity can be the measurand, a measurement signal, or another quantity to be used in calculating the value of the measurand. For a material measure, the indication is the value assigned to it.

Instrument constant is the coefficient by which the direct indication of the measuring instrument must be multiplied to give the value of the measurand, or of a quantity to be used to calculate the value of the measurand.

Calibration coefficient is the quotient of the conventional true value of the quantity to be measured and the direct indication of the instrument normalized to the reference conditions. The calibration coefficient is equivalent to the instrument constant multiplied by the calibration factor.

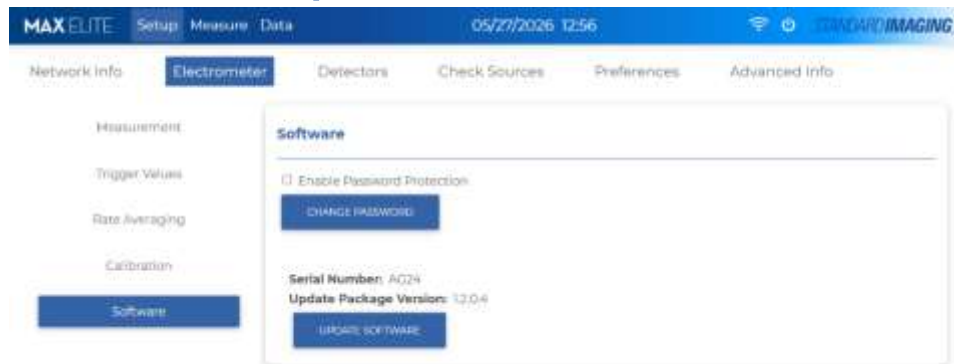
Calibration factor is the factor by which the indication (direct indication multiplied by the instrument constant), of the device is multiplied to obtain the conventional true value of the quantity to be measured under reference conditions.

13.5 Password Protection

The MAX Elite includes a password protection feature that locks key preferences and setup parameters so that they can be changed only by an authorized user. To enable password protection, select **Setup -> Electrometer -> Software** and check the **Enable Password Protection** box. The MAX Elite is initially set with a default password of 3120. To change the password, select **Change Password** and follow the prompts on the screen.

Note: If you forget your password, a reset can be enabled using an Administrator Password from Standard Imaging.

13.6 Software Version and Updates



The MAX Elite serial number and software package version are displayed onscreen. If a software update is available, copy the update .pkg file from Standard Imaging to the root (top) directory of a USB drive that is formatted to FAT32 file format. No other .pkg files can be present in this directory. Insert the USB drive into the MAX Elite, and press **Update Software**. Follow the prompts on the screen.

NOTE: When performing a system update, do not remove the USB drive until the electrometer has rebooted and the warmup screen is displayed.

13.7 Network Connections

The MAX Elite may be connected to your network using an Ethernet cable or WiFi connection. To set up the Ethernet connection, your network must allow the device to be assigned a dynamic IP address. The IP address will be displayed along with the device MAC Address and Host Name at the upper right corner of the *Setup -> Network Info* page.



To set up and enable wireless connectivity to the device, go to the *Setup* page by tapping the **Setup** button in the menu at the top of the touchscreen. To turn on wireless connectivity, simply slide the **WiFi** toggle to the right. This action is disabled if the device is already connected to the network via Ethernet.



To turn off wireless connectivity, slide the WiFi toggle to the left.



To connect to a WiFi network, first turn on the **WiFi** toggle. Next, select the **Scan for networks** button. Select the network you wish to connect to, enter the network password, and select **Connect**. The connected network will be shown under *Current Network*, and the IP address will be displayed.

13.8 Remote operation

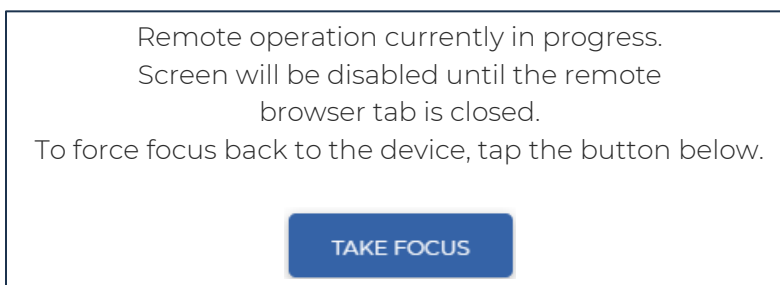
The MAX Elite 2 and MAX Elite 4 can be operated remotely if they are connected to a local network. To access the control page, open a Chrome browser on a computer that is connected to the same network, and navigate to this address:

`http://<electrometer_IP_address>:3000/#/splash`

where `<electrometer_IP_address>` is the IP Address displayed on the *Setup -> Network Info* page. For example, if the electrometer IP Address is 192.168.1.143, the web address to access the device is `http://192.168.1.143:3000/#/splash`

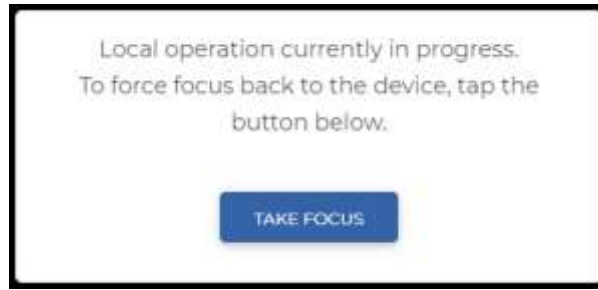
NOTE: The MAX Elite will not operate using an https connection.

During remote operation, the screen on the MAX Elite will display a message stating that remote operation is currently in progress.



To return control of the electrometer to the device itself, press **Take Focus**.

The remote screen will now display a message stating that local operation is currently in progress.



To control the electrometer from the remote browser, select **Take Focus**.

14 Troubleshooting

14.1 Questionable Readings

If readings are off, determine if there is any leakage from the MAX Elite or ionization chamber. Follow the steps under General Operation (see Section 3).

14.2 No Response

If the MAX Elite does not respond to any commands from the touch screen for more than 10 seconds, unplug the unit and then plug it back in.

14.3 Electromagnetic or Other Interference

If the MAX Elite causes or is affected by interference with other equipment, try to correct the interference by performing the following:

- Increase separation between equipment.
- Connect the power supply power cord into a different grounded AC outlet or into a circuit controlled by a different circuit breaker.
- Consult Standard Imaging, Inc.

14.4 Cannot Detect USB Flash Drive

The following error may occur when searching for the USB flash drive:

"Failed to scan USB drive. Please insert an unencrypted USB drive. If one is plugged in, wait a few seconds then try again"

This error will occur if the USB Flash Drive does not have sufficient available memory for the file, or if the USB Flash Drive format is not supported by the MAX Elite. The MAX Elite supports only FAT and FAT32 file systems.

This error will also occur if an attempt to save data to the USB Flash Drive is made too soon after the drive has been inserted. In this case, wait a few seconds and try saving the file again.

14.5 Zero Drift

If zero drift or measurement deviation is suspected, please perform the following troubleshooting steps:

1. Make sure the MAX Elite has been unplugged and allowed to cool to room temperature for at least 4 hours.
2. Plug in the MAX Elite to turn on the device.
3. Select the maximum available channels for your device and put all channels in low range.
4. Tap the **Zero** button to zero the MAX Elite with nothing connected to the triaxial inputs. Ensure the dust caps are in place.
5. If the rate reading is more than ± 10 fA on any channel over the course of two hours, you should send your MAX Elite back to Standard Imaging for service. A return authorization can be requested at support@standardimaging.com.
6. If checking the high range, the rate reading threshold is ± 5 pA.

15 Parts and Accessories List

REF	Description
90025	MAX Elite Electrometer
80996	MAX Elite User Manual
20474	MAX Elite Power Supply
50379	MAX Elite Carrying Case
72730	Optional International Power Cord Set
50400	USB Flash Drive

16 Maintenance

Maintenance of the electrometer may be required to ensure continued safe operation.

As is standard practice for other electrometers, it is recommended that the MAX Elite be calibrated every two years. This calibration should be performed by an accredited dosimetry calibration laboratory (ADCL).

Exterior cleaning of the device can be done with a soft brush and a cloth. Gently brush all surfaces to remove dirt and dust. Remove any remaining dirt with a cloth slightly dampened with a solution of mild detergent and water or a liquid disinfecting agent. Do not use water or liquid on triax jacks. Do not permit any liquid to seep into the MAX Elite in any manner during cleaning. It is not recommended to clean the window of the LCD with anything other than a mild detergent and a very soft cloth. Failure to use a soft cloth may result in a scratched display, and this may impair the visibility of the LCD.

There are no user serviceable parts in the MAX Elite.

Sterilization of the MAX Elite is not required.



If assistance is desired in the proper disposal or recycling of this product (including accessories and components), after its useful life, please return to Standard Imaging.

16.1 Triaxial Connector Cleaning Procedure

Over the years, Standard Imaging has received product reports of drift or leakage involving its ion chambers, well chambers and electrometers. During the investigation and/or servicing of these products it became apparent that a significant portion of these reports were caused by dirty triax connectors. The cause is typically dust that has collected on the inside connector.

To minimize these reports and unnecessary service, Standard Imaging is providing a triax connector cleaning procedure. This triax connector cleaning procedure should be periodically completed or whenever there are concerns of drift or leakage. Heavier product use may require more frequent cleanings.

Prior to cleaning a triax connector, ensure:

- The ion chamber or well chamber is disconnected from the electrometer.
- There is no water or moisture visible in the triax connector.

To clean a dirty triax connector:

- Remove the connector cap (if applicable).
- Use only a dry and oil free compressed air source, such as Chemtronics® Ultra Jet.
- Gently blow dirt and contaminants from the inside of the connector, moving the air source in a circular manner a few inches from the connector.

After cleaning a dirty triax connector, use the connector cap when not in use (if applicable).

Do not:

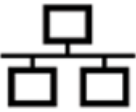
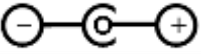
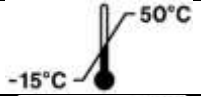
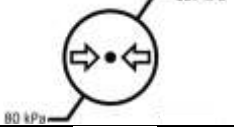
- Use sharp objects to attempt to clean a dirty triax connector.
- Use a compressed gas other than air.
- Use a compressed gas source that may have moisture or oil in the source or lines.
- Use your mouth to blow on the connector.
- Disassemble the connector.
- Touch the internal parts of the connector with your finger.

If this procedure does not resolve the drift or leakage issues, contact the Customer Service Administrator to coordinate the return of the product to Standard Imaging for further service.

If there are any questions or comments regarding this information, please contact Standard Imaging or your authorized dealer.

17 Description of Symbols

The following symbols are used on the MAX Elite Electrometer:

	Attention, consult accompanying documents
	Dangerous voltage present inside enclosure
	Consult user's guide before use
	Power on
	USB port
	Ethernet port
	Camera
	9VDC @ 2.0A power supply input. Center positive. Use only with specified power supply.
	Shipping and storage temperature limits
	Shipping and storage humidity limits
	Shipping and storage pressure limits
	The device meets the essential requirements of Council Directive 93/42/EEC concerning medical devices
	Manufacturer. This symbol is accompanied by the name and address of the manufacturer
	Manufacturing date. This symbol is accompanied by a date to indicate the date of manufacture.

	Device part number
	Serial number. This symbol is accompanied by the manufacturer's serial number adjacent to it.
	Medical device
	Separate collection of electrical and electronic devices in accordance with EC Directive 2002/96/EC: Do not dispose of the device with normal domestic waste. Keep separate from domestic waste and dispose in an environmentally safe way in compliance with local regulations.
	China RoHS II Compliant

18 Electromagnetic Compatibility

18.1 Electromagnetic Emissions

Guidance and Manufacturer's Declaration - Electromagnetic Emissions.

The MAX Elite is intended for use in the electromagnetic environment specified below. The customers or the users should ensure that it is used in such an environment.

Emissions Test	Compliance	Electromagnetic environment - guidance
RF radiated emissions CISPR 11	Class A, Group 1	RF emissions are low and are not likely to cause any interference in nearby electronic equipment
RF conducted emissions CISPR 11	Class A, Group 1	
Harmonic distortion IEC 61000-3-2	Class A, < 16A	The MAX Elite is suitable for use in all establishments other than domestic and those directly connected to the public low-voltage supply network that supply buildings used for domestic purposes.
Voltage fluctuations/flicker emissions IEC 61000-3-3	All parameters, <16A	

18.2 Electromagnetic Immunity

Guidance and Manufacturer's Declaration - Electromagnetic Immunity.

The presence of electromagnetic disturbances may degrade the device's Essential Performance by causing fluctuations in the current and charge readings.

The MAX Elite is intended for use in the electromagnetic environment specified below. The customers or the users should ensure that it is used in such an environment.

Immunity test	IEC 60601 test level	Compliance test	Electromagnetic environment - guidance
Electrostatic discharge (ESD) IEC 61000-4-2	±8 kV contact +/-2kV, +/-4kV, +/-8kV, ±15 kV air	±8 kV contact +/-2kV, +/-4kV, +/-8kV, ±15 kV air	Floors should be wood, concrete, or ceramic tile. If floors are covered with synthetic material, the relative humidity should be at least 30%.
Electrical fast transient/burst IEC 61000-4-4	±2 kV for power supply lines ±1 kV for input/output lines	±2 kV for power supply lines ±1 kV for input/output lines	Mains power quality should be that of a typical commercial or hospital environment.

Surge IEC 61000-4-4	±1 kV line(s) to lines ±2 kV line(s)	±1 kV line(s) to line(s) ±2 kV line(s) to earth	Mains power quality should be that of a typical commercial or hospital environment.
Voltage dips, short interruptions and voltage variations on power supply input lines IEC 61000-4-11	0% U_T ; 0.5 cycle at -0°, 45°, 90°, 135°, 180°, 225°, 270°, 315° 0% U_T ; 1 cycle 70% U_T ; 25/30 cycles 0° 0% U_T ; 250/300 cycles	% U_T ; 0.5 cycle at -0°, 45°, 90°, 135°, 180°, 225°, 270°, 315° 0% U_T ; 1 cycle 70% U_T ; 25/30 cycles 0° 0% U_T ; 250/300 cycles	Mains power quality should be that of a typical commercial or hospital environment. If the User of the MAX Elite requires continued operation during power mains interruptions, it is recommended that the MAX Elite is powered from an uninterruptible power supply or a battery.
Power frequency (50/60 Hz) magnetic field IEC61000-4-8	3 A/m	3 A/m	Power frequency magnetic fields should be at levels characteristic of a typical commercial or hospital environment.
Surge Immunity IEC 61000-4-5	±0.5kV, ±1kV Line-to-Line ±0.5kV, ±1kV, ±2kV Line-to-Ground	±0.5kV, ±1kV Line-to-Line ±0.5kV, ±1kV, ±2kV Line-to-Ground	Mains power quality should be that of a typical commercial or hospital environment.
Immunity test	IEC 60601 test level	Compliance test	Electromagnetic environment – guidance
Conducted RF IEC 61000-4-6	6V in ISM bands between 80% A_m at 1 kHz 3V 150 kHz to 80 MHz	6V 3V	Portable and mobile RF communications equipment should be used no closer to any part of the MAX Elite, including cables, than the recommended separation distance calculated from the equation applicable to the frequency of the transmitter. Recommended separation distance: $d=1.2 \sqrt{P}$ 150 kHz to 80 MHz
Radiated RF IEC 61000-4-3	3 V/m 80 MHz to 2.7 GHz 80% AM at 1 kHz Section 8.10	3 V/m Section 8.1	$d=0.35 \sqrt{P}$ 80 MHz to 800 MHz $d=0.7 \sqrt{P}$ 800 MHz to 2.7 GHz where P is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer and d is the recommended separation

			distance in meters (m). Field strengths from fixed RF transmitters, as determined by an electromagnetic site survey, ^a should be less than the compliance level in each frequency range. ^b Interference may occur in the vicinity of equipment marked with the following symbol:
NOTE 1: UT is the a.c. mains voltage prior to application of the test level. NOTE 2: At 80 MHz and 800 MHz, the higher frequency range applies. NOTE 3: These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.			
a. Field strengths from fixed transmitters, such as base stations for radio (cellular/cordless) telephones and land mobile radios, amateur radio, AM and FM radio broadcast and TV broadcast cannot be predicted theoretically with accuracy. To assess the electromagnetic environment due to fixed RF transmitters, an electromagnetic site survey should be considered. If the measured field strength in the location in which MAX Elite used exceeds the applicable RF compliance level above, the MAX Elite should be observed to verify normal operation. If abnormal performance is observed, additional measures may be necessary, such as re-orienting or relocating the device. b. Over the frequency range 150 kHz to 80 MHz, field strengths should be less than 3 V/m.			

18.3 Recommended separation distances

Recommended Separation between Portable and Mobile RF Communications Equipment and the MAX Elite.

The MAX Elite is intended for use in an electromagnetic environment in which radiated RF disturbances are controlled. The customer or the user of the MAX Elite can help prevent electromagnetic interference by maintaining a minimum distance between portable and mobile RF communications equipment (transmitters) and the MAX Elite as recommended below, according to the maximum output power of the communications equipment.

Rated maximum output power of transmitter (W)		Separation distance according to frequency of transmitter (m)		
		150 kHz to 80 MHz $d=1.2 \sqrt{P}$	80 MHz to 800 MHz $d=0.35 \sqrt{P}$	800 MHz to 2.5 GHz $d=0.7 \sqrt{P}$
MAX Elite	0.01	0.12	0.12	0.23
	0.1	0.38	0.38	0.73
	1	1.2	1.2	2.3
	10	3.8	3.8	7.3
	100	12	12	23
For transmitters rated at a maximum output power not listed above, the recommended separation distance d in meters (m) can be estimated using the equation applicable to the frequency of the transmitter, where P is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer. NOTE 1: At 80 MHz and 800 MHz, the separation distance for the higher frequency range applies. NOTE 2: These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.				

Proper maintenance of the electrometer may be required to ensure continued safe operation in the presence of electromagnetic disturbances.

WARNING: Use of this equipment adjacent to or stacked with other equipment should be avoided because it could result in improper operation. If such use is necessary, this equipment and other equipment should be observed to verify they are operating normally.

The MAX Elite EMC compliance was evaluated using anticipated worst case detector cable lengths. Thus, other detectors can be used.

WARNING: Use of accessories, transducers and cables other than those specified or provided by the manufacturer of this equipment could result in increased electromagnetic emissions or decreased electromagnetic immunity of this equipment and result in improper operation.

WARNING: Portable RF communications equipment (including peripherals such as antenna cables and external antennas) should be used no closer than 30 cm (12 inches) to any part of the

MAX Elite, including cables specified by the manufacturer. Otherwise, degradation of performance of this equipment could result.

NOTE: The emissions characteristics of this equipment make it suitable for use in industrial areas and hospitals (CISPR 11 class A). If it is used in a residential environment (for which CISPR 11 class B is normally required) this equipment might not offer adequate protection to radio-frequency communication services. The user might need to take mitigation measures, such as relocating or re-orienting the equipment.

19 Explanation of Saved File Export

When exporting data from the MAX Elite, the file type is a *.CSV file, (comma separated value), that can be directly opened with any spreadsheet application. The resulting file will have data labels as described below.

19.1 Measurement Data

Column	Data Label	Description
A (1)	IDENTIFIER	Measurement identification number
B (2)	Channel	Measurement channel number
C (3)	Time	Date and time when measurement was taken, in the format YYYY-DD-MM HH:MM:SS
D (4)	Charge	Charge value, if applicable
E (5)	Rate	Rate value, if applicable
F (6)	Dose	Dose or dose rate value, if applicable
G (7)	Dose Unit	Dose or dose rate unit of value in Dose column, if applicable
H (8)	Charge Unit	Charge unit of value in Charge column, if applicable
I (9)	Rate Unit	Rate unit of value in Rate column, if applicable

20 Features and Specifications

Channels	1, 2, or 4 channels – factory configurable.
Measuring Range IEC60731 Reference Class	LOW: 0.4000 pA - 1.0000 nA, 0.4000 pC – 100 mC HIGH: 0.0400 nA - 1.0000 μ A, 0.0400 nC – 100 C
Bias Voltage	0, ($\pm$) 10 - 1000 V in 1 V increments 10-24VDC $\pm$ 10% 25-49VDC $\pm$ 5% 50-1000VDC $\pm$ 1% 1 μ A max
Range Switching:	User selectable – High and Low
Selectable Display Resolution: LOW: Rate mode/Charge mode HIGH: Rate mode/Charge mode	0.001 pA / 0.001 pC or 0.0001 pA / 0.0001 pC 0.001 nA / 0.001 nC or 0.0001 nA / 0.0001 nC
Repeatability:	Low range: $\leq \pm 0.25\%$ High range: $\leq \pm 0.15\%$
Long Term Stability:	$\leq \pm 0.5\%$ over 1 year
Stabilization Time:	$\leq \pm 0.1\%$
Non-linearity:	$\leq \pm 0.25\%$
Zero Drift:	$\leq \pm 0.25\%$
Zero Shift:	$\leq \pm 0.25\%$
Response Time (90%):	Low range rate: 2.20 seconds, High range rate: 2.20 seconds Low range charge: 1.95 seconds, High range charge: 0.26 seconds
Main Software Functions:	Individual measurement for Channel 1, Channel 2, Channel 3, or Channel 4; Channel 1 & 2 measurement; Four Channel measurement; Chamber Library; Check Source Database; Preferences
Charge Collection Modes:	Timed Mode - Selectable timer from 1 to 86400 seconds in 1 second increments. 500 repeated collections. Continuous Mode (Manual Start/Stop) - Press Start to begin collection and Stop to end Trigger Mode – current exceeding pre-selected trigger values starts measurement, and current below pre-selected stop trigger value stops collection
Countup/Countdown Resolution:	1 second
Trigger Levels for Charge Collection:	Start value must be larger than stop value. Low Range 10fA – 1nA. High Range 10pA – 10nA

Operating Parameters: Temperature: Relative Humidity:	15 to 35 °C 20 to 80% non-condensing
Storage Parameters: Temperature: Relative Humidity:	-15 to 50 °C 10 to 95% non-condensing
Display:	Color LCD IPS touch screen. WXGA (1280x800) resolution, 10.1" diagonal
Code Reader	Data Matrix Code Reader.
Input Connection:	BNC two lug triaxial connector (TNC option is available.)
Zeroing:	Zero via button push - Display indicates zeroing in progress 1-30 seconds.
Connectivity:	Ethernet 10/100Mbit USB 2.0 (keyboard, flash drive, or mouse support) Wi-Fi Dual Band 2.4/5GHz, 802.11ac/a/b/g/n.
Chamber library calibration coefficients:	Ampere System Factors: $N_{sk}: \mu\text{Cym}^2/(\text{h}^*\text{A})$ $N_{sk}: \text{Gym}^2/(\text{h}^*\text{A})$ $N_{x,sk}: \text{Rm}^2/(\text{h}^*\text{A})$ $N_A: \text{GBq/A}$ $N_A: \text{Ci/A}$ $N_{D,w}: \text{mGy}/(\text{sec}^*\text{A})$ $N_A: \text{MBq/A}$ $N_A: \text{mCi/A}$ Coulomb System Factors: $N_k: \text{Cy/C}$ $N_x: \text{R/C}$ $N_{Gas}: \text{Gy/C}$ $N_D: \text{Gy/C}$ $N_{D,w}: \text{Gy/C}$
Real-Time Clock:	On board, for timekeeping and data time stamp.
Audio:	On board speaker for audio feedback
Dimensions: Width: Height: Length:	26.7 cm (10 in) 8.1 cm (7 in) 21.1 cm (5.5 in)
Weight:	2.3 kg (5.05 lbs) (4-channel)
Mode of Operation:	Continuous, Timed, or Triggered
Power Requirements:	100-240 VAC, 50/60 Hz input to external power supply, 9 VDC, 2.0 A power supply output to electrometer input, Globtek®, Inc. model GTM 96180-1811-2.0-T. The use of any other power supply and using alternates other than the UL/CSA recognized power cord can degrade minimum

	safety. The proper replacements from Standard Imaging, Inc. are required for compliance with the requirements of IEC 60601-1.
Product Standards:	IEC 60601-1-2 Edition 4.1:2020 IEC 60601-1-6:2010/AMD2:2020, IEC 60601-1:2005/AMD2:2020, ¹ IEC 60731 (Reference Class) ² ¹ Externally Certified; ² Designed to Meet

See www.standardimaging.com for applicable tech notes.

Specifications are subject to change without notice.

21 WARRANTY STATEMENT- 4424-18

Standard Imaging, Inc. sells this product under the warranty herein set forth. The warranty is extended only to the buyer purchasing the product directly from Standard Imaging, Inc. or as a new product from an authorized dealer or distributor of Standard Imaging, Inc.

For a period provided in the table below from the date of original delivery to the purchaser or a distributor, this Standard Imaging, Inc. product, provided in the table, is warranted against functional defects in design, materials, and workmanship, provided it is properly operated under conditions of normal use, and that repairs and replacements are made in accordance herewith. The foregoing warranty shall not apply to normal wear and tear, or if the product has been altered, disassembled, or repaired other than by Standard Imaging, Inc. or if the product has been subject to abuse, misuse, off-label use, negligence or accident.

Product	Warranty Period
Standard Imaging Ionization Chambers	5 years
Standard Imaging Detectors	1 year
Standard Imaging Well Chambers	2 years
Standard Imaging Electrometers	5 years
Standard Imaging BeamChecker Products	2 years
TomoScanner and TomoElectrometer	2 years
Standard Imaging Software Products	1 year
All Other Standard Imaging Products	1 year
Standard Imaging Custom Products	1 year
Standard Imaging Remanufactured Products	180 days
Standard Imaging Custom Select Products	90 days
Consumables	90 days
Serviced Product	90 days (for service performed)
Resale Products	As defined by the Original Equipment Manufacturer
ADCL Product Calibration (Standard Imaging uses the UW-ADCL for recalibrations required under warranty, unless otherwise requested)	0 - 90 days = 100% of ADCL Calibration Costs 91 - 182 days = 75% of ADCL Calibration Costs 183 - 365 days = 50% of ADCL Calibration Costs 366 - 639 days = 25% of ADCL Calibration Costs (days from date of shipment to customer)

Standard Imaging's sole and exclusive obligation and the purchaser's sole and exclusive remedy under the above warranties are, at Standard Imaging's option, limited to repairing, replacing free of charge or revising labeling and manual content on, a product: (1) which contains a defect covered by the above warranties; (2) which are reported to Standard Imaging, Inc. not later than seven (7) days after the expiration date of the warranty period in the table; (3) which are returned to Standard Imaging, Inc. promptly after discovery of the defect; and (4) which are found to be defective upon examination by Standard Imaging Inc. All transportation charges (including customs, tariffs, duties and brokerage fees) are the buyer's responsibility. This warranty extends to every part of the product excluding consumables (fuses, batteries, or glass breakage) or material reactions. Standard Imaging, Inc. shall not be otherwise liable for any damages,

including but not limited to incidental damages, consequential damages, or special damages. Repaired or replaced products are warranted for the balance of the original warranty period, or at least 90 days.

This warranty is in lieu of all other warranties, express or implied, whether statutory or otherwise, including any implied warranty of fitness for a particular purpose. In no event shall Standard Imaging, Inc. be liable for any incidental or consequential damages resulting from the use, misuse or abuse of the product or caused by any defect, failure, malfunction or material reactions of the product, whether a claim of such damages is based upon the warranty, contract, negligence, or otherwise.

This warranty represents the current standard warranty of Standard Imaging, Inc. Please refer to the labeling or instruction manual of your Standard Imaging, Inc. product or the Standard Imaging, Inc. web page for any warranty conditions unique to the product.

22 Serialization Information

Standard Imaging products that are serialized contain coded logic in the serial number which indicates the product, day and year of manufacture, and a sequential unit number for identification:

A YY DDD X

A Unique product ID

YY Last two digits of the year
(e.g., 1999 = 99, 2000 = 00)

DDD Day of the year ($1 \leq \text{DDD} \leq 365$)

X Unique unit ID number ($0 \leq X \leq 9$)



23 Customer Care Policy Statement

Standard Imaging, at its discretion, may extend customer support only to the buyer purchasing the product directly from Standard Imaging, Inc. or as a new product from an authorized dealer or distributor of Standard Imaging, Inc. This customer care statement is in lieu of all other customer support statements, express or implied, whether statutory or otherwise, including any implied statements of fitness for a particular purpose.

Standard Imaging:

- Technical support is preferentially biased to those customers with valid and applicable Standard Imaging Certificate of Maintenance agreements.
- Technical support may range from providing detailed solutions to upgrade recommendations to the latest version of software for discontinued products.
- Will, at a minimum, provide technical support during its normal hours of operation.
- May, at its discretion, limit support of ancillary systems beyond its direct control, such as information technology systems, database management and 3rd party programs.
- Will provide technical support for the product for a minimum of 7 years from the date of delivery or discontinuance.

- Will not provide technical support for obsolete products, those products which are 7 years past the date of discontinuance.
- Will provide technical support for any and all involving issues with significant product risk, regardless of product age.

This customer care statement represents the current standard customer care statement of Standard Imaging, Inc. Please refer to the labeling or instruction manual of your Standard Imaging, Inc. product or the Standard Imaging, Inc. web page for any customer care statement conditions unique to the product. Specifications subject to change without notice.

24 Customer Responsibility

This device and its components will perform properly and reliably only when operated and maintained in accordance with the instructions contained in this manual and accompanying labels. A defective device should not be used. Parts which may be broken or missing or are clearly worn, distorted or contaminated should be replaced immediately with genuine replacement parts manufactured by or made available from Standard Imaging Inc.

 CAUTION: Federal law in the U.S.A. and Canadian law restrict the sale, distribution, or use of this product to, by, or on the order of a licensed medical practitioner. The use of this product should be restricted to the supervision of a qualified medical physicist.

 CAUTION: As desired by IAEA, English is the default language for labeling and manuals. If translated versions are available, resolve any differences in favor of the English versions.

 WARNING: Measurement of high activity radioactive sources is potentially hazardous and should be performed by qualified personnel.

 WARNING: Proper use of this device depends on careful reading of all instructions and labels.

 WARNING: Where applicable, Standard Imaging products are designed to be used with the versions of common radiation delivery devices, treatment planning systems and other products or systems used in the delivery of ionizing radiation, available at the time the Standard Imaging product is released. Standard Imaging does not assume responsibility, liability and/or warrant against problems with the use, reliability, safety or effectiveness that arise due to the evolution, updates or changes to these products or systems in the future. It is the responsibility of the customer or user to determine if the Standard Imaging product can be properly used with these products or systems.

Should repair or replacement of this product become necessary after the warranty period, the customer should seek advice from Standard Imaging Inc. prior to such repair or replacement. If this product is in need of repair, it should not be used until all repairs have been made and the product is functioning properly and ready for use. After repair, the product may need to be calibrated. The owner of this product has sole responsibility for any malfunction resulting from abuse, improper use or maintenance, or repair by anyone other than Standard Imaging Inc.

Standard Imaging will make numerous and reasonable attempts to contact a customer following completed manufacture or service of a product. Should a customer product remain at Standard Imaging for more than 1 year following its completed manufacture or service, Standard Imaging reserves the right to resell, restock, donate, discard or destroy the product.

If, in relation to the use of this product, a death or a serious deterioration of health has occurred, this should be reported to Standard Imaging, Inc. and the National Competent Authority of the country in which the incident occurred. When in doubt, please consult with an advisor or reach out to Standard Imaging, Inc. for further assistance.

The information in this manual is subject to change without notice. Please see www.standardimaging.com for the latest information. No part of this manual may be copied or reproduced in any form or by any means without prior written consent of Standard Imaging Inc.

25 Service Policy

If service, including recalibration, is required, please contact Standard Imaging's Customer Service department by phone or email prior to shipping the product. Standard Imaging's Customer Service and Technical Service staff will attempt to address the product issue via phone or email. If unable to address the issue, a return material authorization (RMA) number will be issued. With the RMA number, the product can be returned to Standard Imaging. It is the responsibility of the customer to properly package, insure and ship the product, with the RMA number clearly identified on the outside of the package. The customer must immediately file a claim with their carrier for any shipping damage or lost shipments. Return shipping and insurance is to be pre-paid or billed to the customer, and the customer may request a specific shipper. Items found to be out of warranty are subject to a minimum service fee of 1 hour labor (excluding recalibrations) for diagnostic efforts and require a purchase order (PO) before service is performed. With concurrence from customer, the product may be replaced if it is unserviceable or if the required service is cost prohibitive. Products incurring service charges may be held for payment. Standard Imaging does not provide loaner products. See the Standard Imaging Warranty and Customer Responsibility for additional information.

26 Return Policy

No merchandise will be accepted for credit without prior approval of return. Please contact Standard Imaging's Customer Service Department to receive a return authorization number before returning any merchandise for exchange or credit. Products manufactured by Standard Imaging must be returned within thirty days of receipt of order in 'like new' condition. No credit will be given for products returned after thirty days from receipt of order. A minimum twenty percent restocking fee will be charged on all returned merchandise. All materials returned must be shipped pre-paid. Credit for returned goods will be issued to customer's account for use against future purchases of merchandise only. Special orders, custom products, re-sale (not manufactured by Standard Imaging) products, and ADCL calibrations will not be accepted for return credit or exchange.

All products may not be registered, cleared, licensed or approved for sale in all countries or territories. Please contact Standard Imaging Customer Care for details.

27 SOFTWARE LICENSE AGREEMENT

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Standard Imaging (SI), Inc., a Wisconsin corporation hereby grants to the purchaser of the product (Licensee) the right to use the product, together with its documentation and other related materials, only in connection with the computers or computer network system located at the site of use (the site) previously designated as such by Licensee and only if in strict compliance with the terms and conditions set forth below. Any purchase and installation or use of the product shall constitute acceptance of an agreement by Licensee to be bound by the terms and conditions hereof. Licensee also agrees that the agreement terms and conditions will prevail in the event of any conflict between the agreement and applicable purchase order or other ordering documents.

All rights not specifically granted to licensee under this software license agreement are reserved by SI. The SI documented Warranty and Customer Responsibility statements shall be considered to be part of this agreement. The term of this agreement and the licenses granted hereunder will continue in perpetuity, unless sooner terminated by SI.

Licensee shall:

- a. Use the product only on the authorized number of computers, network systems or number of linear accelerators at the site of use as provided in the related product and/or sales documentation;
- b. Make backup copies of the product only for back-up, recovery and archival purposes;
- c. Authorize SI to use non-patient related data compiled, free of charge, from the Licensee's use of the product for its own use, shared use with other medical device manufacturers for quality assurance purposes and/or the independent promotion of scientific knowledge, provided that SI does not identify the name of the Licensee to the general public;
- d. Authorize SI to communicate to the Licensee via email regarding the product.

Licensee may not and shall not:

- a. Make copies of the product, except as otherwise permitted herein;
- b. Rent, lease, sub-lease or otherwise permit any third party to use the product;

- c. Redistribute any portion of the product, its software programs, documentation, or other related materials;
- d. Other than as set forth in section 1.b. above, copy the product, any of its software programs, documentation or other related materials, without the express written permission of SI;
- e. Remove or obscure copyright and/or trademark notices appearing on the product;
- f. Reverse engineer the product in order to derive or appropriate for any reason or purpose the source code or any other trade secret or other proprietary information;
- g. Transfer the software program of the product to another site or to a third-party purchaser without the express written permission of SI and agreement to all the terms and conditions of the then current software license agreement utilized by SI by the authorized representative of the new site or such third party.

The licensee shall be solely responsible for the installation of the product and any updates provided by SI. SI shall provide telephone technical support for the product for a period of (1) one year from the date of shipment. Any updates, upgrades and new releases to the product within the period of (1) year from date of shipment will be provided at no additional costs. After the expiration of the period of (1) year from the date of shipment, SI will provide technical support, and updates, upgrades and new releases for an additional fee.

SI shall not be liable for any amount in excess of the product costs actually paid by the licensee, giving rise to any claims hereunder. In no event shall SI be liable, whether in contract, tort or otherwise for any indirect, incidental or consequential damages arising out of the subject matter of this agreement.

In the event of breach by Licensee of any of the terms and conditions of this software license agreement, SI shall be entitled to enforce all legal rights and remedies conferred upon it by State of Wisconsin, federal, and/or international law. SI and Licensee acknowledge that because breach by Licensee of any of the terms or conditions of this agreement will likely cause irreparable harm to SI, injunctive relief would be an appropriate remedy for SI resulting from any such breach by Licensee. In the event that action, suit, or legal proceedings are initiated or brought to enforce any or all of the provisions of this agreement, the prevailing party shall be entitled to such attorney's fees, costs, and disbursements as are deemed reasonable and proper by a court of law or an arbitrator. In the event of an appeal of an initial decision of a court or of an arbitrator, the prevailing party shall be entitled to such attorney's fees, costs, and disbursements as are deemed reasonable and proper by such appellate court.

Notwithstanding the foregoing, in the event of any breach by Licensee of the terms and conditions of this agreement, SI may, upon reasonable advance written notice to Licensee (which in no event shall be less than (30) thirty days), terminate this license. Upon such termination by SI, Licensee shall furnish SI with a sworn affidavit stating that all of the product, including, without limitation, its software program(s), documentation and other related material and any copies thereof, have been returned by certified mail, return receipt requested to SI or destroyed by Licensee.

This agreement shall be deemed executed in the State of Wisconsin and shall be interpreted and construed in accordance with the laws of the State of Wisconsin. If any provision of this

agreement is judicially declared to be invalid, unenforceable, or void by a court of competent jurisdiction, such decision shall not have the effect of invalidating or voiding the remainder of this agreement and the part or parts of this agreement so held to be invalid, unenforceable, or void shall be deemed to be deleted from this agreement and the remainder of this agreement shall have the same force and effect as if such part or parts had never been included.

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CE 0413

EU	REP	Hoff & Lowendahl AB Högåsvägen 125 SE-741 41 Knivsta, Sweden
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