Chipsmall

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With the principle of "Quality Parts,Customers Priority,Honest Operation,and Considerate Service",our business mainly focus on the distribution of electronic components. Line cards we deal with include Microchip,ALPS,ROHM,Xilinx,Pulse,ON,Everlight and Freescale. Main products comprise IC,Modules,Potentiometer,IC Socket,Relay,Connector.Our parts cover such applications as commercial,industrial, and automotives areas.

We are looking forward to setting up business relationship with you and hope to provide you with the best service and solution. Let us make a better world for our industry!

Contact us

EM Aware Monitor
Installation, Operation and Maintenance

Made in the
United States of America

Figure 1. SCS EM Aware Monitor

Description

The SCS EM Aware Monitor monitors up to three key parameters that keep you aware of critical symptoms of ESD problems: ESD events, change in static voltage field, and ionizer performance*. The thresholds for these parameters are fully adjustable. The monitor is constructed of an aluminum enclosure, LCD display, control joystick, remote antenna, power adapter and data output terminal.

ESD events generate electromagnetic radiation. The stronger the ESD event, the stronger the electromagnetic radiation. The EM Aware Monitor is a miniature radio receiver tuned to detect and measure the unique waveform generated by an ESD event.

The EM Aware Monitor meets the Continuous Monitor requirements of ANSI/ESD S20.20 in accordance with ESD TR1.0-01 and ANSI/ESD STM3.1. It meets the recommendations of ESD Handbook ESD TR20.20 which includes "if the products that are being produced are of such value that knowledge of a continuous, reliable ground is needed, and then continuous monitoring should be considered or even required".

*Ionization monitoring is only available in item CTC034-031-5-WW. Compatible with critical environment ionizers only. The ionizer must have a balance (offset voltage) of ±5V or better.

The EM Aware Monitor and its accessories are available as the following item numbers:

Item	Description
CTC034-030-3-WW	EM Aware Monitor, ESD Events, 4.20mA Output
CTC034-030-5-WW	EM Aware Monitor, ESD Events, Modbus Output
CTC034-031-5-WW	EM Aware Monitor, ESD Events, Static Field & Ionization, Modbus Output
770038	Data Logger, Dataq DI-710, for EM Aware Monitor
CTA212	Power Adapter, 100-240VAC Input, 12VDC 1.5A Output, All Plugs
CTC111-6FT	Antenna, Room Temperature, 6 ft.
CTC118-6FT	Antenna, High Temperature, 6 ft.
CTC118-10FT	Antenna, High Temperature, 10 ft.

Packaging

1 EM Aware Monitor
1 CTC111-6FT Antenna with 6 ft. Cable
1 Monitor Ground Cord (Green and Yellow)
1 Power Adapter, 12VDC, with interchangeable plugs (North America, UK/Asia, Europe)
1 Certificate of Calibration

SCS - 926 JR Industrial Drive, Sanford, NC 27332
East: (919) 718-0000 | West: (909) 627-9634 • Website: StaticControl.com

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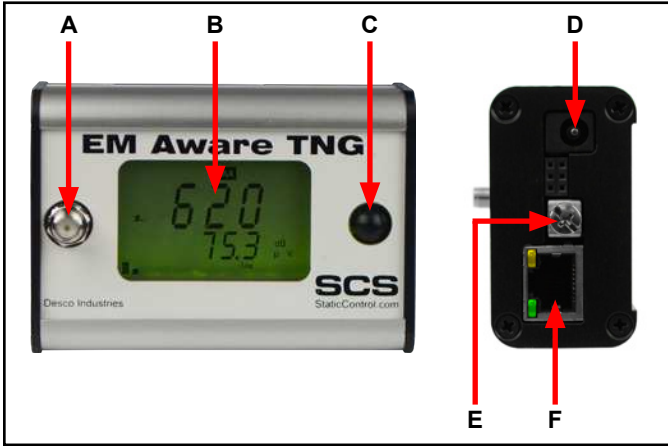
Features and Components

Figure 2. EM Aware Monitor features and components

A. Antenna Input: Connect to the antenna using the included cable.

B. LCD Display: Displays measurements and settings.

C. Joystick: Toggles displayed measurements and monitor settings.

D. Power Jack: Connect the included 12VDC power adapter here.

E. Ground Terminal: Common ground point for the monitor.

F. Data Output: Model CTC034-030-3-WW outputs a 4.20 mA analog signal for use with the 770038 Data Logger.

Models CTC034-030-5-WW and CTC034-031-5-WW output Modbus serial communication for use with Static Management Program (SMP).
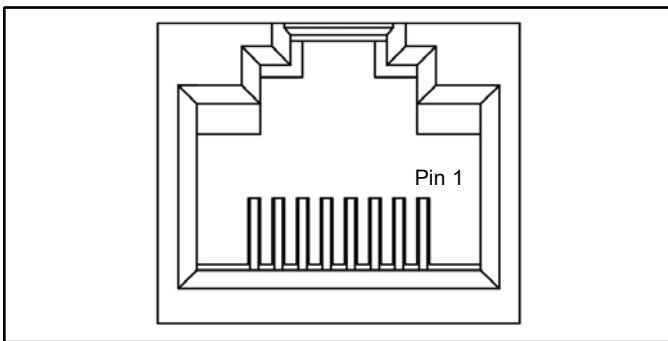

Figure 3. Output connector pin-out

Pin	Analog Output	Modbus Output
1	ESD event, 4.20mA (0-5V)	Unused
2	Do not connect	Do not connect
3	Supply voltage (+12VDC)	Supply voltage (+12VDC)
4	Static voltage, 4.20mA (1-5V)	TxD-/RxD-
5	Static decay, 4.20mA (1-2V)	TxD+/RxD+
6	Ground	Ground
7	Do not connect	Do not connect
8	Do not connect	Do not connect

Installation

1. Remove the monitor and antenna from the carton and inspect for damage.

2. Determine the installation location of the antenna. For optimal performance, position the antenna as close as practically possible to the anticipated source of ESD activity. Use the mounting tabs on the antenna to properly secure it to the desired location.

3. Connect the anntena's cable to the EM Aware Monitor without bending it.

4. Determine the mounting location of the monitor. Its display should be visible to the operator. Use the two 4-40 threaded holes at the back of its enclosure if desired.

5. Secure one end of the included ground cord to the ground terminal located on the right-side of the monitor. Attach the other end of the cord to a ground point. The face plate screw of a grounded AC wall outlet may provide a convenient connection point.

6. Connect the power adapter to the power jack located on the right-side of the monitor. Route the wire from the supply to a nearby AC outlet and plug it into the outlet. Make sure the voltage and frequency match those listed on the power supply. The monitor is now powered.
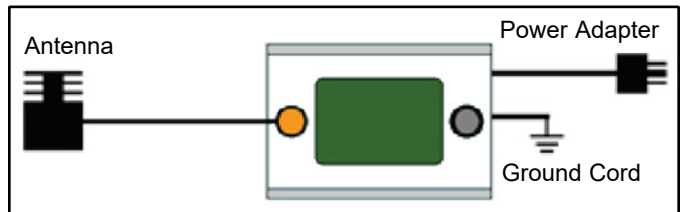

Figure 4. Stand-alone setup for the EM Aware Monitor

Operation

Controlling the EM Aware Monitor

The EM Aware Monitor is controlled using a 5-position joystick located to the right of its display. The joystick can be toggled left, right, up, and down and pushed inward.

The EM Aware Monitor will default to the ESD Event display upon completion of its boot-up sequence. Toggling the joystick left, right, up and down all serve the same function and advance the display to the next channel. See Figure 5.

Push down and hold the joystick for 3 seconds to enter the displayed settings.
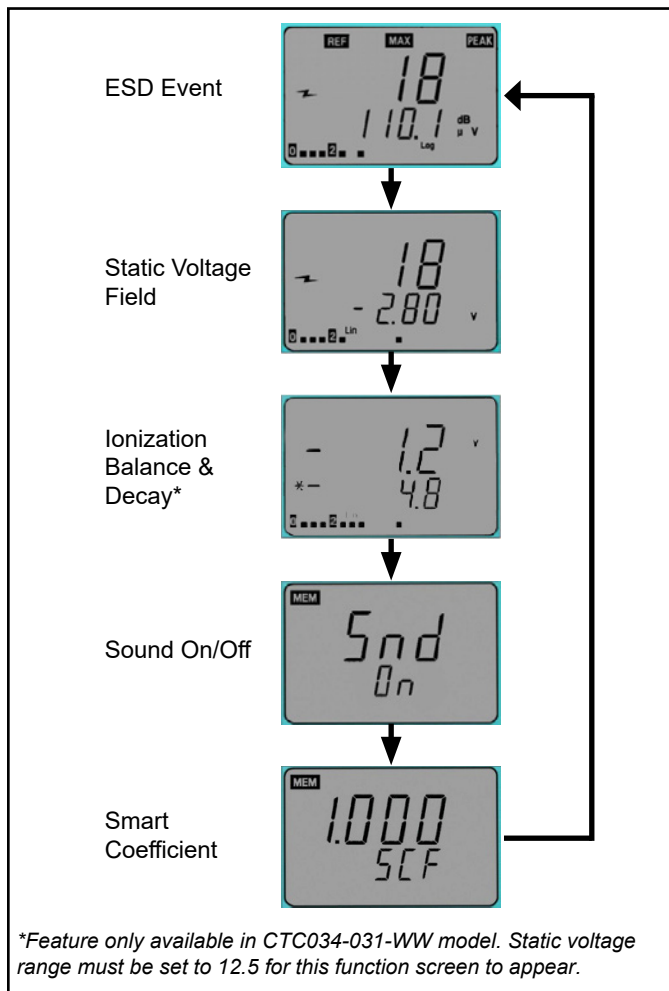

ESD Event

Static Voltage Field

Ionization Balance & Decay*

Sound On/Off

Smart Coefficient

Feature only available in CTC034-031-WW model. Static voltage range must be set to 12.5 for this function screen to appear.

Figure 5. Cycling through the modes on the display
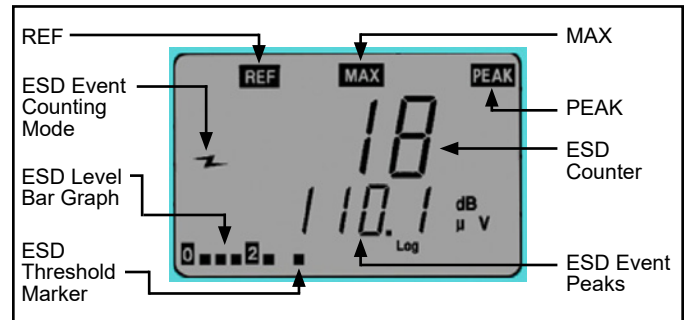
ESD Event Channel

Figure 6. ESD Event channel

REF: Indicator appears during ESD event threshold setup.

ESD Event Counting Mode: Denotes that ESD event counting is active

ESD Level Bar Graph: Displays the current ESD level.

ESD Threshold Marker: Marks the ESD event threshold on the ESD level bar graph.

MAX: Indicates the maximum magnitude of ESD event within the last second duration.

PEAK: Indicates that the noise filter is enabled. If "PEAK" is not displayed, the noise filter is disabled.

ESD Counter: Counts the number of events over the set threshold. The maximum number is 1999 and resets to 0 once this limit is exceeded.

ESD Event Peaks: Voltage level that is received by the antenna which is a result of an ESD event near the antenna. It is measured in dBμV.

ESD Event Settings

1. Toggle the joystick until the ESD Event channel is displayed (Figure 6).

2. To reset the ESD counter to zero, push down the joystick momentarily.

3. To change the ESD threshold, push down and hold the joystick until "ESD" is displayed. The "REF" indicator will appear on the top-left corner of the display to indicate that the ESD threshold value can be modified. Toggle the joystick left to decrease the threshold. Toggle the joystick right to increase the threshold. Hold the joystick in either direction to quickly increment the value.

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Figure 7. Modifying the ESD event threshold

4. When the noise filter is enabled, the EM Aware will detect mostly ESD events and ignore other signals such as EMI. If the noise filter is disabled, all signal types will be detected. To disable or enable the noise filter, enter the ESD threshold settings as described in the previous step, and then toggle the joystick up or down. "Cdr OFF" indicates that the filter is disabled, and "Cdr On" indicates that the filter is enabled.

Figure 8. Enabling the noise filter

5. Push down the joystick momentarily to save all settings. "MEM" will appear temporarily in the top left corner while the settings are saved. The monitor will then re-boot after the save is completed.

   NOTE: The monitor will revert back to its last saved settings if idled for 10 seconds while in the settings menu. The joystick must be pushed down in order to save all modifications to the settings.
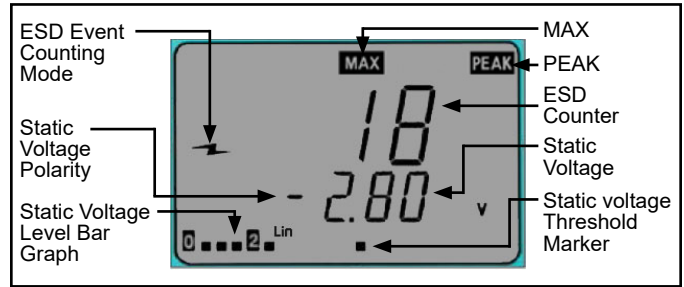
Static Voltage Field Channel

Figure 9. Static Voltage Field channel

ESD Event Counting Mode: Indicates that ESD event counting is active.

Static Voltage Polarity: Denotes the polarity of the static voltage peaks.

Static Voltage Level Bar Graph: Displays the current change in static voltage field magnitude regardless of polarity.

MAX: Indicates the maximum magnitude of static voltage within the last second duration.

PEAK: Appears when the measured static voltage exceeds the voltage range.

ESD Counter: Counts the number events over the set threshold. The maximum number is 1999 and resets to 0 once this limit is exceeded.

Static Voltage: The current value of the signal being measured by the antenna expressed in volts.

Static Voltage Threshold Marker: Marks the static voltage threshold setting.

Principle of Operation of Static Voltage Monitor

The Static Voltage channel measures the change of electrostatic field. Any change in electrostatic field induces voltage on the antenna via capacitive coupling. An electrostatic field that is stationary does not induce voltage on the antenna, so the EM Aware will show a decreasing value.

Indication of Static Voltage

The Static Voltage Level Bar Graph in the bottom left corner of the display indicates absolute magnitude of static voltage regardless of polarity. An audible alarm will sound when voltage of any polarity exceeds the preset alarm level.

Static Voltage Settings

1. Toggle the joystick until the Static Voltage channel is displayed (Figure 9).

2. To reset the ESD counter to zero, push down the joystick momentarily.

3. To change the voltage range and thresholds, push down and hold the joystick until "REF" is displayed on the top-left corner. "REF" indicates that the settings can be modified.

4. Toggle the joystick up or down to scroll through the voltage range options (12.5, 100, 250, 500, 1000 volts). Select the 12.5 volt range to enable the ionization balance function if desired.

   NOTE: The ionization balance function is only available in the CTC034-031-5-WW model.

5. Toggle the joystick left to decrease the threshold. Toggle the joystick right to increase the threshold. Hold the joystick in either direction to quickly increment the value.

6. Push down the joystick momentarily to save all settings. "MEM" will appear temporarily in the top left corner while the settings are saved. The monitor will then re-boot after the save is completed.

   NOTE: The monitor will revert back to its last saved settings if idled for 10 seconds while in the settings menu. The joystick must be pushed down in order to save all modifications to the settings.
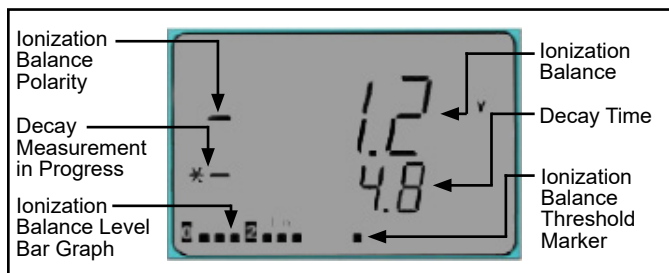
Ionization Balance and Decay Channel

Figure 10. Balance and Decay Mode channel

Ionization Balance Polarity: Indicates the polarity of the ionizer's balance (offset voltage).

Decay Measurement in Progress: Appears when the decay time is being measured.

Ionization Balance Level Bar Graph: Indicates the balance (offset voltage) levels.

Ionization Balance: Displays the ionizer's balance (offset voltage).

Decay Time: Displays the amount of seconds to decay a static charge. "1--.--" will display if the decay time exceeds 16 seconds.

Ionization Balance Threshold Marker: Marks the balance (offset voltage) threshold setting.

NOTE: The EM Aware Monitor is compatible with steady-state DC critical environment ionizers only. The ionizer must have a balance (offset voltage) of ±5V or better.

Ionization Balance and Decay Settings

NOTE: These settings cannot be changed unless the static voltage range is set to 12.5 volts. See "Static Voltage Settings" on page 4.

1. Toggle the joystick until the Ionization Balance and Decay channel are displayed (Figure 10).

2. Push down the joystick momentarily to manually measure the ionizer's balance (offset voltage) and decay time. The ***-** symbols will appear while the measurements are being taken. The balance (upper row) and decay time (lower row) will update at the end of the tests. Balance and decay time are automatically measured every three minutes. Static voltage monitoring becomes idle when balance and decay tests are performed. ESD event monitoring operates normally.

3. To change the voltage range and thresholds, push down and hold the joystick until "REF" is displayed on the top-left corner. "REF" indicates that the settings can be modified. The value in the top row indicates the current balance threshold, and the value in the bottom row indicates the decay time threshold.

4. Toggle the joystick down to decrease the decay time threshold. Toggle the joystick up to increase the decay time threshold. Hold the joystick in either direction to quickly increment the value.
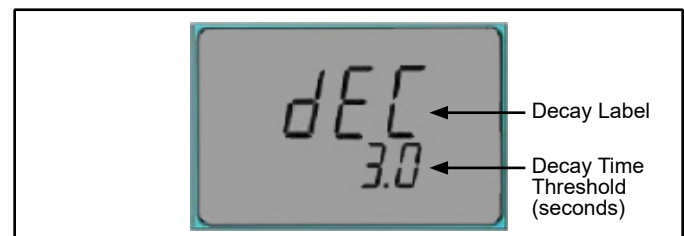

Figure 11. Decay time threshold settings

5. Toggle the joystick left to decrease the balance threshold. Toggle the joystick right to increase the balance threshold. Hold the joystick in either direction to quickly increment the value.

Figure 12. Ionization balance screen

6. Push down the joystick momentarily to save all settings. "MEM" will appear temporarily in the top left corner while the settings are saved. The monitor will then re-boot after the save is completed.

   NOTE: The monitor will revert back to its last saved settings if idled for 10 seconds while in the settings menu. The joystick must be pushed down in order to save all modifications to the settings.

Audible Alarm Settings

1. Toggle the joystick until the Sound channel is displayed.

Figure 13. Sound On/Off screen

2. To change the audible alarm setting, push down and hold the joystick until the setting below "Snd" blinks.

Figure 14. Sound On/Off change screen

3. Toggle the joystick left or right to disable or enable the audible alarm.

4. Push down the joystick momentarily to save all settings. "MEM" will appear temporarily in the top left corner while the settings are saved. The monitor will then re-boot after the save is completed.

Smart Coefficient (SCF)

The Smart Coefficient (SCF) feature works in conjunction with the static voltage field channel. This feature is useful when an approximate voltage is desired, especially when the distance is not exact. For example, a known 1000V static voltage source should show approximately 1000V on the EM Aware Monitor when its antenna is 5 inches away from the static voltage source. This 1000V approximation will change as the antenna is located further away from the static voltage source. It may show a value close to 600V instead.

The Smart Coefficient function allows a correction factor to compensate for the variable distance. To bring the approximated voltage value back to 1000V, the SCF value will have to be set to 1.66. Alternatively, if the antenna is moved closer, the monitor may show 1400V. In this case, an SCF value of 0.71 will bring the reading back to 1000V.

NOTE: All numbers referenced in the previous paragraph are for illustration purposes only. They should not be referenced for accuracy.

The Smart Coefficient has a default setting of 1.000, and it can be adjusted from 0.001 to 1.999. When adjusting the Smart Coefficient, it is important to have a known static voltage source as a reference for setting the SCF value. This voltage source may be a Pulse Generator, a Charged Plate Monitor (1 KV typically), or a Function Generator.

Smart Coefficient (SCF) Settings

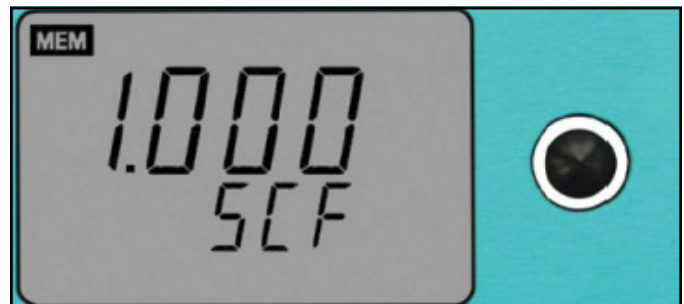1. Toggle the joystick until the Smart Coefficient channel is displayed.

Figure 15. Smart Coefficient channel

2. To change the Smart Coefficient value, push down and hold the joystick until the value blinks and "REF" is displayed on the top-left corner. "REF" indicates that the settings can be modified.
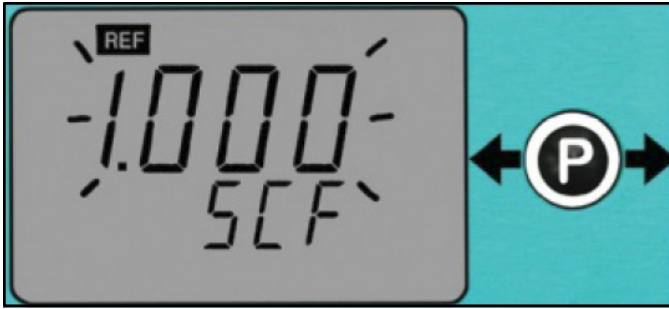
Figure 16. Setting the Smart Coefficient value

3. Toggle the joystick left to decrease the value. Toggle the joystick right to increase the value. Hold the joystick in either direction to quickly increment the value.

4. Push down the joystick momentarily to save all settings. "MEM" will appear temporarily in the top left corner while the settings are saved. The monitor will then re-boot after the save is completed.

   NOTE: The monitor will automatically save the value on the display if idled for 10 seconds while in the settings menu.

EM Aware Calculator Software

Use the EM Aware Calculator to estimate ESD event voltages. Simply enter the dBµV measurement from the EM Aware Monitor and the distance from the event source to the remote antenna. The EM Aware Calculator will provide an approximate voltage for the ESD event based on CDM, HBM and MM models.

1. Use the link below to download the EM Aware Calculator Software.
   http://staticcontrol.descoindustries.com/Downloads/EMAwareCalculator.zip

2. Extract the contents of the zip folder, and run "setup.exe". Follow the on-screen prompts to install the software.

3. Run the EM Aware Calculator to estimate ESD event voltages based off dBµV measurements from the EM Aware Monitor and distance settings.
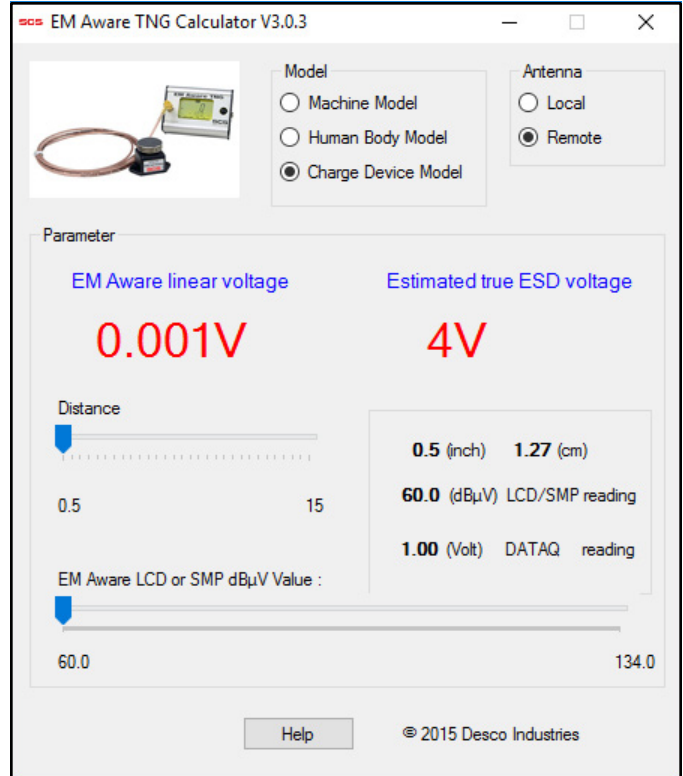

Figure 17. EM Aware Calculator Software

DATAQ® Data Logger for EM Aware Monitor

Combine the SCS 770038 DATAQ® Data Logger with the CTC034-030-3-WW EM Aware Monitor to build a diagnostic kit and help identify problematic ESD areas. DATAQ WinDaq Data Acquisition Software is included with every unit, and it displays and stores real-time data captured by the EM Aware Monitor. The data logger accepts the analog output from up to 6 EM Aware Monitors. It has a two port channel. Channel 1 displays ESD event magnitude and channel 2 display the change in static voltage. Up to 960 samples are recorded per second for the EM Aware Monitor channel displayed.

Figure 18. SCS 770038 DATAQ® Data Logger for EM Aware Monitor

Static Management Program (SMP)

SCS Static Management Program (SMP) continuously monitors your ESD process control system throughout all stages of manufacturing. Static Management Program (SMP) captures data from SCS workstation, equipment and ESD event continuous monitors and provides a real-time picture of critical manufacturing processes. All activity is stored into a database for on-going quality control purposes. Static Management Program (SMP) allows you to pinpoint areas of concern and prevent ESD events. Quantifiable data allows you to see trends, become more proactive and prove the efficiency of your ESD process control system.

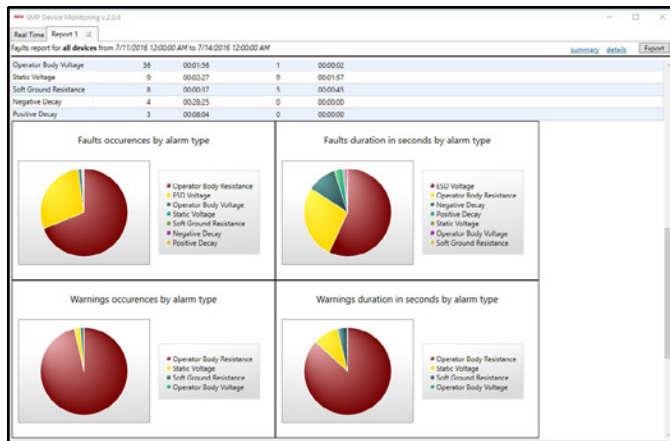SMP is compatible with EM Aware Monitor models CTC034-030-5-WW and CTC034-031-5-WW.

Figure 19. SMP reporting

Maintenance

Cleaning

Disconnect the power adapter from the device. Clean the EM Aware Monitor and its antenna using a dry brush or vacuum cleaner. Clean its contacts using a contact cleaner or brush, and tighten all connections. Do not reconnect the power adapter until cleaning is finished.

Repairs and Servicing

There are no user-serviceable parts. Do not attempt to repair the EM Aware Monitor yourself. Contact an SCS sales representative or authorized distributor to request inspection and repair.

Calibration

Contact an SCS sales representative or authorized distributor to request for product calibration if necessary.

Specifications

Power	
Power Adapter 100-240VAC 50-60 Hz	Output: 12VDC @ 1.5A Output Plug Polarization: Center Positive Output Plug: 5.5 mm O.D. x 2.1 mm I.D. x 9.5 mm L

ESD Event Monitor	
Measurement	Magnitude ESD Event
ESD Event Threshold	Default setting: 80 dBµV
Raw Input Signal	60 dBµV (~1mV) to 134 dBµV (~5.0V)
Filtering Function	ESD

Static Voltage Monitor	
Measurement	Static Voltage - Change of electrostatic field
Static Voltage Setting Range	12.5V, 100V, 250V, 500V, 1000V, smart coefficient adjust
Output	Analog: 4-20mA Digital: RS485

Ionizer Voltage and Decay Monitor (CTC034-031-5-WW only)	
Compatible Ionizer	Steady-State DC
Max. Decay Time Reading	16 seconds** max, typical
Max. Decay Test Voltage	(+) and (-) 5 Volt

Connectivity	
Input	SMA Connector for Remote antenna
Outputs	RJ45 connector 4-20mA analog or RS485 digital output

General	
Alarm	Buzzer
Display	LCD
Dimensions (antenna not included)	3.27" W x 2.24" H x 2.05" D (83 mm W x 57 mm H x 52 mm D)
Weight	183g

**The readings of ionization voltage and decay under identical conditions may not always correlate with a charged plate monitor. The EM Aware Monitor is not intended to replace regular testing of ionizers by a charged plate monitor.*

Safety Information

Please read, understand, and follow all safety information contained in these instructions prior to the use of this device. Retain these instructions for future reference.

Intended Use
The SCS EM Aware Monitor monitors up to three key parameters that keep you aware of critical symptoms of ESD problems: ESD events, change in static voltage field, and ionizer performance. The thresholds for these parameters are fully adjustable. The monitor is constructed of an aluminum enclosure, LCD display, control joystick, remote antenna, power adapter and data output terminal.

The systems must be installed as specified in this user guide in an indoor commercial/industrial environment, and have not been evaluated for other uses or locations. If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

Warning
To reduce the risks associated with hazardous voltage and fire:
- Do not use the power supply if damaged
- Replace power supply if damaged using only SCS supplied parts.
- Do not modify or attempt to service the power supply. Return to SCS for service.
- Do not use the EM Aware Monitor or its power supply outdoors or in wet/humid environments.
- Do not use the EM Aware Monitor or its power supply outside of the operating conditions listed in this User Guide.
- Use only a dry cloth when cleaning.

To reduce the risks associated with hazardous voltage:
- Use only the power supply provided by SCS and specified for the country of use.
- Do not simultaneously power the EM Aware Monitor with the power supply and the RJ45 data cable.
- Do not position the monitor accessories or other equipment where unplugging the power supply is difficult.
- Always locate the power source (socket or outlet) near the equipment. The power supply plug serves as the disconnect device.

Caution
To reduce the risks associated with environmental contamination:
- Dispose of monitor and power supply in accordance with all applicable local and government regulations.

Notice
To reduce the risk of damage to components or assemblies being handled:
- Monitor must be checked periodically to verify each test mode is functioning correctly.
- Ensure proper operation of the monitor by performing operational verification test as required.
- Always properly ground your tools and dissipative surfaces to before connecting them to the EM Aware Monitor.

FCC
This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Industry Canada ICES-003 Compliance:
CAN ICES-3 (A)/NMB-3(A)

Environmental Conditions

This equipment has been tested and found to be safe to operate within these environmental conditions.

This is not a warranty of equipment performance within these conditions.
- Indoor use only
- Ingress Protection: IPX0
- Altitude: Up to 2,000 m
- Mains supply voltage fluctuations up to ± 10% of the nominal voltage.
- Transient over-voltages up to the levels of overvoltage category II.
- Temporary over-voltages occurring on mains supply.
- Pollution degree 2.
- Temperature: Maximum 110°F / 43°C, Minimum 50°F / 10°C
- Humidity: Maximum relative humidity 80% for temperatures up to 31°C decreasing linearly to 50% relative humidity at 40°C.

Regulatory Information

China RoHS
Electronic Industry Standard of the People's Republic of China, SJ T11363-2006, Requirements for Concentration Limits for Certain Hazardous Substances in Electronic Information Products

This symbol, per Marking for the Control of Pollution Caused by Electronic Information Products, SJ/T11364-2006, means that the product or part does contain a substance, as detailed in the chart below, in excess of the following maximum concentration values in any homogeneous material: (a) 0.1% (by weight) for lead, mercury, hexavalent chromium, polybrominated biphenyls or polybrominated diphenyl ethers; or (b) 0.01% (by weight) for cadmium. Unless otherwise stated by SCS in writing, this information represents SCS best knowledge and belief based upon information provided by third party suppliers to SCS.

Part or Component Name	Hazardous Substances or Elements					
	(Pb)	(Hg)	(Cd)	(CrVI)	(PBB)	(PBDE)
Solder in instrument	X	O	O	O	O	O

O: Indicates that this hazardous substance contained in all of the homogeneous materials for this part is below the limit requirement in the SJ/T11363-2006.

X: Indicates that this hazardous substance contained in at least one of the homogeneous materials used for this part is above the limit requirement in the SJ/T11363-2006.

Limited Warranty, Warranty Exclusions, Limit of Liability and RMA Request Instructions

See the SCS Warranty -
http://staticcontrol.descoindustries.com/Limited-Warranty.aspx

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