3M™ WS Aware Workstation Monitor

Models CTC061, CTC062

Dual Workstation Monitor for Critical Environments

User's Guide

3M

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With the 3M™ WS Aware Workstation Monitor, you won't have to *guess* whether your process is ESD-safe—you will *know*. With the WS Aware monitor, you can assess ESD safety of your environment, verify the effectiveness of your ESD-preventive measures and determine where you need ESD protection the most.

WS Aware monitors provide valuable data to data acquisition or facility monitoring systems. If your company doesn't yet have a system in place, please contact your 3M representative for assistance.

WS Aware monitors provide data on personnel grounding (connectivity to ground and body voltage), two metal grounds (i.e. tools, etc.), EMI on the metal grounds and two dissipative (surface) grounds.

Please read this User's Guide before installation so you can properly use your WS Aware Workstation Monitor.

3M™ WS Aware Workstation Monitors

Models CTC061 and CTC062

Safety Statements

Read, understand, and follow all safety information contained in the user guide prior to installation of the 3M™ WS Aware Workstation Monitors CTC061 and CTC062. Retain the instructions for future reference.

Intended Use

The WS Aware Dual Workstation Monitor is both a wrist strap monitor and a ground monitor. It provides operator grounding, and monitors the resistance and body voltage of electronics assembly personnel. The WS Aware Model CTC061 additionally monitors the ground connection of two dissipative mats and two metal grounds, whereas the WS Aware Model CTC062 monitors the ground connection of four metal grounds. The product can inform the user when excess charge is present or grounding is faulty.

To provide complete assurance of operator's grounding, the optional Big Brother terminal for the WS Aware monitor detects the operator's presence within arm's reach of the workstation. If this operator is not grounded, the WS Aware monitor will sound an alarm.

The systems must be installed as specified in the 3M™ WS Aware Workstation Monitors CTC061 and CTC062 Monitors User Guide and are intended for use in an indoor commercial/industrial environment. The systems have not been evaluated for other uses or locations.

EXPLANATION OF SIGNAL WORD CONSEQUENCES	
⚠ **WARNING:**	Indicates a potentially hazardous situation, which, if not avoided, could result in death or serious injury and/or property damage.
⚠ **CAUTION:**	Indicates a potentially hazardous situation, which, if not avoided, may result in minor or moderate injury and/or property damage.
NOTICE:	Indicates a potentially hazardous situation, which, if not avoided, may result in property damage.

⚠ WARNING:

To reduce the risks associated with hazardous voltage, which if not avoided could result in electrical shock related injury; the risks associated with environmental contamination, which if not avoided could result in environmental contamination related injury; and the risk associated with false test results, which if not avoided could result in property damage:

- Read, understand and follow all safety information contained in this user guide for installation and use. Retain this guide for future reference.
- 3M™ WS Aware Workstation Monitor is not intended to provide grounding to the tools and dissipative surfaces - it only monitors proper grounding. Always properly ground your tools and dissipative surfaces to known good ground before connecting WS Aware monitor for monitoring.
- Always ground WS Aware monitor prior to connecting it to monitored items. Use grounding terminal on the right side of WS Aware monitor for grounding.
- If the WS Aware monitor is connected to a Facility Monitoring System (FMS), always verify that there is zero voltage and low resistance between FMS ground and ground at the location where the WS Aware monitor is installed and is being grounded. If ground conditions are unacceptable, correct them first prior to installing WS Aware monitor, otherwise damage to WS Aware monitor and/or to FMS may occur.

⚠ WARNING CONTINUED:

To reduce the risks associated with hazardous voltage, which if not avoided could result in electrical shock related injury:

- Do not modify or attempt to service the power adapter or use it if damaged.

⚠ CAUTION:

To reduce the risks associated with environmental contamination, which if not avoided could result in environmental contamination related injury:

- Dispose of the monitor and power adapter in accordance with local, state, and federal regulations.

NOTICE:

To reduce the risks associated with property damage:

- Check tester periodically to verify each monitor circuit is functioning correctly.

FCC

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Note: 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

This Class A digital apparatus complies with Canadian ICES-003.

What is Included with your 3M™ WS Aware Workstation Monitor

Your WS Aware monitor package should include the following*:

WS Aware workstation monitor	1 ea.
Remote terminals for wrist straps	2 ea.
10' (3 m) mini-DIN cables for connection between WS Aware monitor and remote terminals	2 ea.
Ring terminal for grounding WS Aware monitor	1 ea.
6x32/1/4" Screw	1 ea.
This User's Guide	1 ea.
Power Adaptor CTA212	1 ea.

If any of the items are missing, please contact 3M, 1-866-722-3736, or one of our authorized distributors immediately.

*Note: Packages containing custom configurations will contain items not included on this typical list.

3M™ WS Aware Workstation Monitor Controls

Wrist Strap Failure LEDs—Red LEDs that turn on when a corresponding wrist strap fails. Blinks when excessive body voltage is present on an operator.

Wrist Strap OK LEDs—Green LEDs that are on when corresponding wrist straps are properly connected and worn.

Ground LEDs (all models): Tri-color LEDs that show the quality of the corresponding metal ground. Green when ground impedance is within limits, red when ground failure, blinking yellow when excessive EMI, off when disabled.

Surface LEDs (CTC061 only): Dual-color LEDs that show the quality of ground connection of the corresponding dissipative surface. Green when ground resistance is within limits, red when there is ground failure, off when disabled.

Ground Connection Terminals: Connect to corresponding ground.

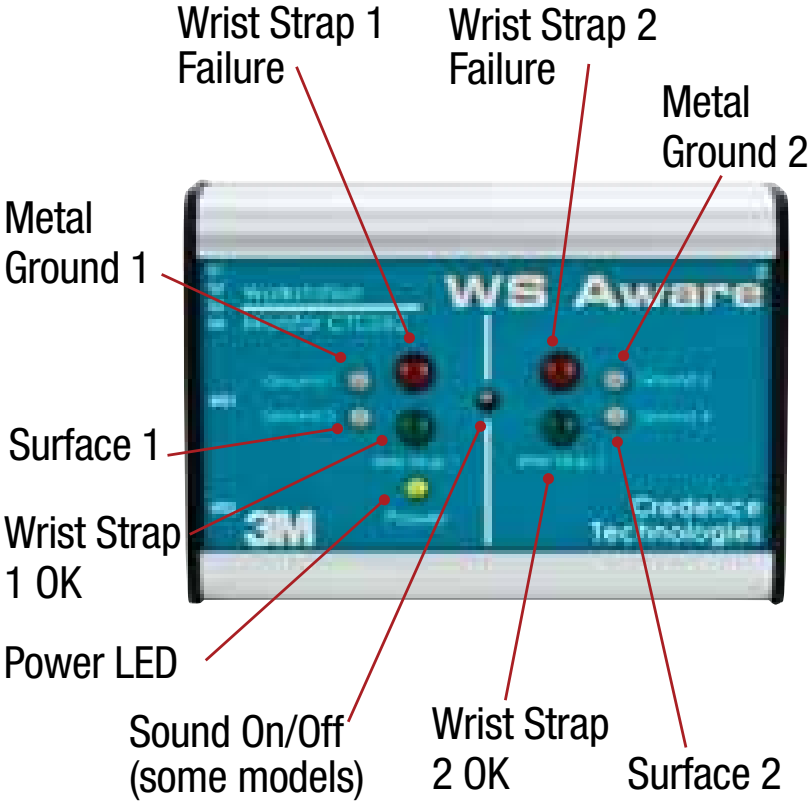
Ground Enable Switches: Enable or disable monitoring of corresponding ground.

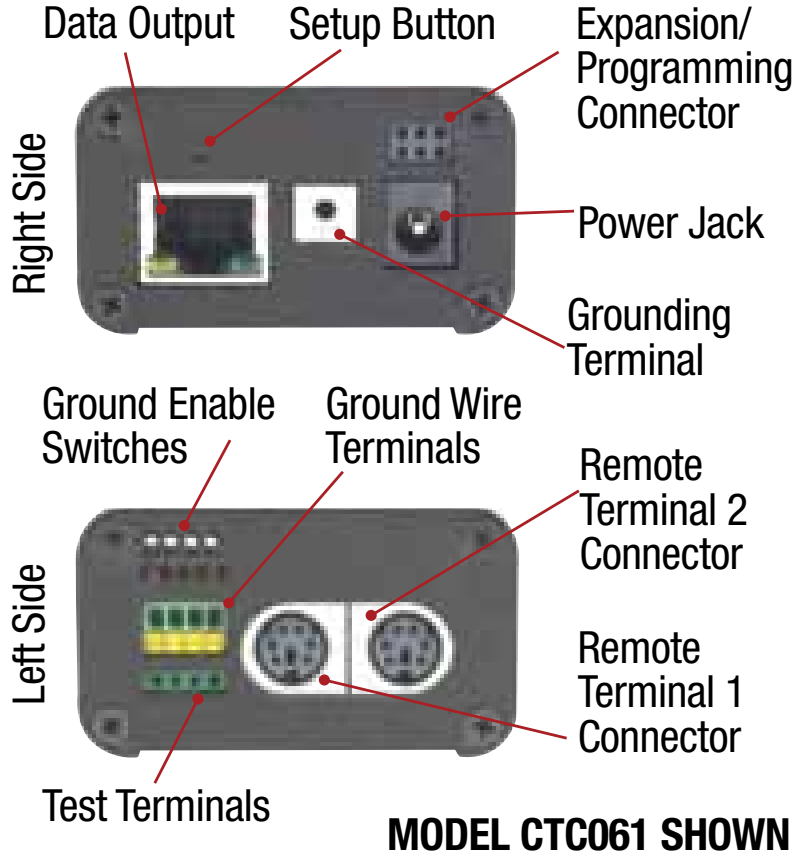
Power LED: Indicates that WS Aware monitor is receiving power.

Setup Button: For models without a sound switch, press to enable sound (you should hear two beeps), press a second time to disable sound (you should hear one beep).

For the rest of controls, please read further.

Brief Tour of your 3M™ WS Aware Workstation Monitor





MODEL CTC061 SHOWN

3M™ WS Aware Workstation Monitor Express Installation

- ❑ Set your WS Aware monitor in a clearly visible, convenient location where it doesn't interfere with your normal work.
- ❑ Secure the wrist strap terminals in easy-to-reach but out-of-the-way locations, such as fastening them to the bottom of the workbenches. Since there are two remote terminals, place each of them in a convenient place for each operator.
- ❑ Connect the WS Aware monitor to its remote terminals using the supplied mini-DIN cables. Route the cables so that they are out of the way and do not interfere.
- ❑ Ground your WS Aware monitor using the supplied ring terminal and screw it to the grounding terminal on the right side of the WS Aware monitor. You will need a crimping tool and a desired length of wire for that. Please make sure that you connect the WS Aware monitor to a known good ground.

- ❑ Using 25-28 AWG wire, connect the ground of those tools that you wish to monitor to the ground terminals on the left side of the 3M™ WS Aware Workstation Monitor. Use a small screwdriver to depress the orange levers when inserting or removing wires. Caution: *This connection is for monitoring only and not for actual grounding.*

- ❑ If you wish to monitor the grounding of 3M™ Static-Dissipative Mats (model CTC061), use the 3M™ Monitor Cord, 2380, connectors and plug in their wires to surface terminals as mentioned above. If you do not already have this cord, please see the accessory section at the end of this manual.

- ❑ Enable monitoring of certain grounds by pushing down the levers of the appropriate switches above the ground terminals.

- ❑ If you will be using your WS Aware monitor with a Facility Monitoring System, you must read the appropriate section in this User's Guide first. If you are using the WS Aware monitor in stand-alone mode, plug the power adapter into the power outlet and plug the cord into the WS Aware monitor. Caution: *Use only the power adapter supplied with the WS Aware monitor!*

Wrist Strap Monitoring

Principle of Operation

The 3M™ WS Aware Workstation Monitor works with dual wrist straps of almost any type that have a **standard** 3.5 mm audio mono plug. The WS Aware monitor verifies proper wearing of a wrist strap by measuring an operator's resistance. For this, the WS Aware monitor provides a signal to the wrist strap. This signal is extremely small (in the order of ~25 millivolts Maximum) and doesn't cause any problems to components or to personnel.

A charge can be easily developed on a body during movements. Though such a charge is quickly drained when an operator is properly grounded, significant voltage may be present on an operator during movements. The WS Aware monitor detects this voltage and if it exceeds the preset level, indicates body voltage presence.

Alarm thresholds for body resistance and body voltage are set at the factory but can be changed in the field. Please contact us or our authorized distributors for details.

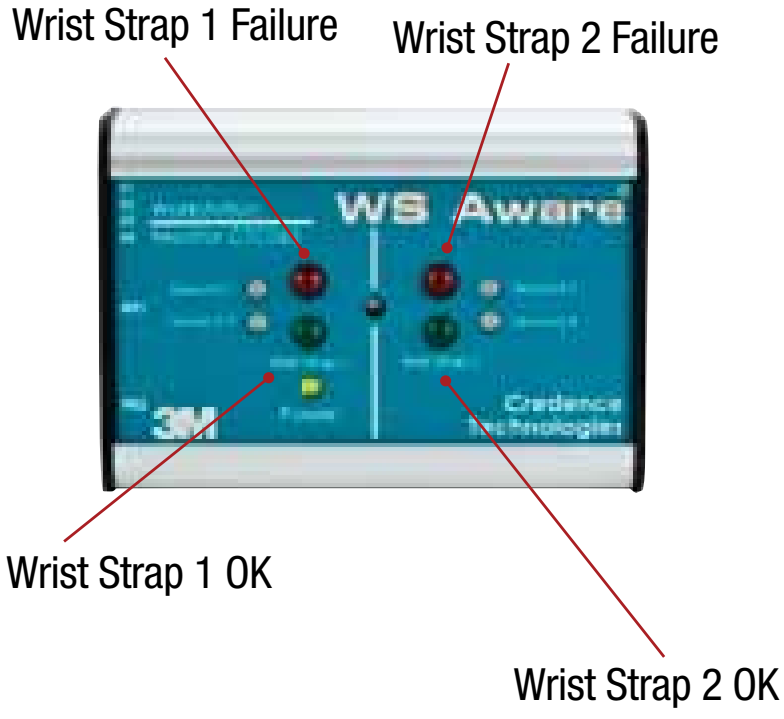
Remote Terminals

The 3M™ WS Aware Workstation Monitor utilizes two separate remote terminals, making it convenient for each operator. Each remote terminal has two 3.5 mm jacks—one for the operator and another one for a visitor. While both jacks provide grounding for the wrist straps, only the operator's jack is monitored. If the wrist strap is plugged into the visitor's jack and the operator's jack is empty, an alarm will sound.

A green LED on the front panel between the jacks indicates that the remote terminal is properly plugged into the working WS Aware monitor. This LED does not provide an indication about proper wearing of the wrist strap.

The WS Aware monitor offers a choice of two types of remote terminals—regular and the 3M™ Big Brother Terminal (shown). Big Brother terminals detect the presence of an operator and sounds an alarm if an operator is present. A red LED on the Big Brother terminal indicates the proximity of an operator regardless of alarm status. Both terminals are interchangeable.

Wrist Strap Indication



A remote terminal is connected to the 3M™ WS Aware Workstation Monitor by a mini-DIN 6-pin male/male cable (supplied). This cable can be unplugged, making remote terminal easy to replace without rerouting the cable.

Monitoring of each wrist strap is done independently. When there is no wrist strap present, both LEDs for each wrist strap are off. When a wrist strap is first plugged in, a red LED may blink for a second or two. If the wrist strap is worn properly, a green light will be on. When a wrist strap fails, a red light will replace the green light. In case of body voltage exceeding the pre-set limit, a green light may still be on if the wrist strap is worn properly, but the red light will blink.

Wrist Strap Output Signals

When connected to a Facility Monitoring System, the 3M™ WS Aware Workstation Monitor provides intelligent output indicating each state of a wrist strap monitor. This table shows the output current (and corresponding voltage into 250 Ohms) corresponding to different states of wrist strap status. This is valid only for 4-20mA output version (-3).

Status	Green LED	Red LED	Buzzer	WS1	WS2	Voltage	Current
						V	**mA**
No wrist strap	Off	Off	Off	Off	Off	5.0	20.0
Wrist strap OK	On	Off	Off	Off	Good	4.6	18.4
Body voltage	On	Blinks	Off	Good	Off	4.2	16.8
Wrist strap Fail	Off	On	Beeps	Good	Good	3.8	15.2
				Off	Bad	2.6	10.4
				Bad	Off	2.2	8.8
				Good	Bad	1.8	7.2
				Bad	Good	1.4	5.6
				Bad	Bad	1.0	4.0

Ground Monitoring

⚠ WARNING:

To reduce the risks associated with hazardous voltage, which if not avoided could result in electrical shock related injury; the risks associated with environmental contamination, which if not avoided could result in environmental contamination related injury; and the risks associated with false test results, which if not avoided could result in property damage:

3M™ WS Aware Workstation Monitor is not intended to provide grounding to the tools and dissipative surfaces - it only monitors proper grounding. Always properly ground your tools and dissipative surfaces to known good ground before connecting WS Aware monitor for monitoring.

Always ground the WS Aware monitor prior to connecting it to monitored items. Use rounding terminal on the right side of WS Aware for grounding.

If the WS Aware monitor is connected to a Facility Monitoring System (FMS), always verify that there is zero voltage and low resistance between FMS ground and ground at the location where the WS Aware monitor is installed and is being grounded. If ground conditions are unacceptable, correct them first prior to installing WS Aware monitor, otherwise damage to WS Aware monitor and/or to FMS may occur.

Ground Monitoring

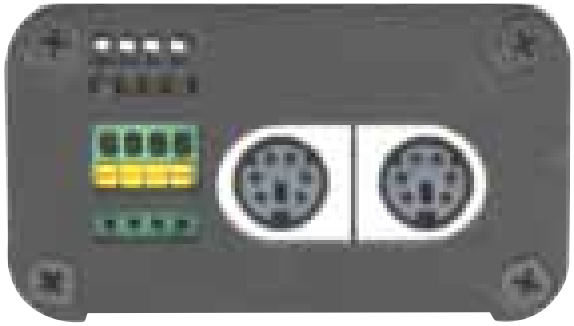
Principle of Operation

As a true dual-workstation monitor, the 3M™ WS Aware Workstation Monitor provides independent monitoring of four grounds—two metal (hard) for tools and fixtures and two dissipative (soft) grounds, such as dissipative mats. WS Aware monitor monitors ground connections in accordance with ANSI 6.1 and ANSI/ESDA S20.20 standards.

Grounding the WS Aware

In order to monitor proper connection to the ground, the WS Aware monitor must be grounded first. Using the supplied ring terminal and screw, connect the WS Aware monitor to a known good ground. If the screw has been misplaced, use #6-32 1/4 screw. Do not use a longer screw. Do not use a wire longer than necessary. Verify the connection between the WS Aware monitor and the ground after grounding.

When using the WS Aware monitor with a Facility Monitoring System, make sure that its ground is the same as the local ground for the WS Aware monitor, otherwise irreversible damage may occur.



Connecting Monitored Items to the 3M™ WS Aware Workstation Monitor

Use 25-28 AWG wires to connect monitored equipment to WS Aware monitor. Use a small screwdriver to depress the orange actuators on the left side of the WS Aware monitor and insert the wire in the terminal openings just above the switches. Use the same method to remove the wire if needed.

The lower four openings are used for test and calibration.

Make sure that there is a good connection to the monitored equipment, otherwise it may result in failure detection.

To connect the WS Aware monitor to dissipative surfaces, such as 3M™ Static Dissipative Mats, (CTC061) use industry-standard connectors. If you are having difficulty obtaining such connectors, please contact 3M or a 3M authorized distributor.

Enabling Monitoring

Monitoring of each individual ground can be enabled or disabled via switches on the left side of the monitor. Pushing the switch lever down with a tip of a pen or with a small screwdriver enables monitoring of a particular ground. Lifting the lever up disables it. When monitoring of a particular ground is disabled, an LED corresponding to that ground is off. Do not enable the ground that is not being monitored as it will create false alarms.

Due to high resistance, it may take up to 20 seconds for the dissipative ground alarm to react. This delay virtually eliminates false alarms.

Monitoring of EMI on Metal Ground

Electromagnetic interference (EMI) can cause equipment lockups and malfunction. The 3M™ WS Aware Workstation Monitor provides monitoring of EMI on metal grounds. It is possible to have a good connection to the ground and presence of large EMI signal on the ground at the same time. Though presence of EMI does not create a failure alarm, it is wise to investigate the cause and take measures to reduce EMI. Please contact 3M for recommendations and for assistance in these matters.

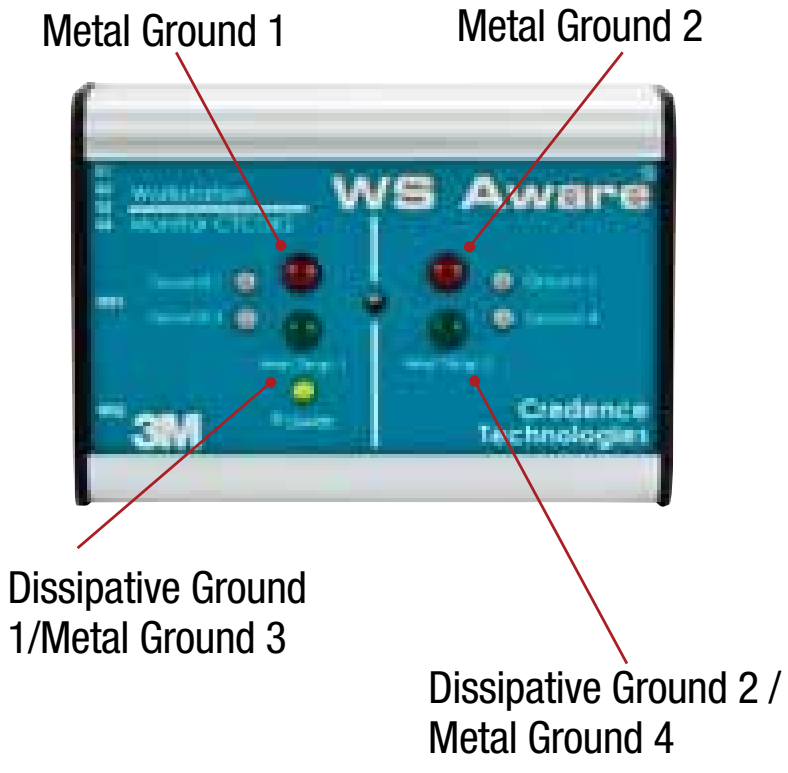
Ground Indication

The following indication is available for each ground:

Status	LED	Buzzer
Ground Disabled	Off	Off
Ground OK	Green	Off
Ground OK + EMI (metal grounds only)	Yellow	Off blinking
Ground Fail	Red	On

Output Signals

When connected to a Facility Monitoring System, The 3M™ WS Aware Workstation Monitor provides intelligent output indicating the state of each ground.



The table to the right shows the output current (or corresponding voltage into 250 Ohms) corresponding to different states of ground.

For a Facility Monitoring System to generate an alarm, it is recommended to set it to a 4.75 V or 19 mA output signal since below this level, there is at least one failure condition.

This information is valid only for 4-20mA output for -3 models.

Surface 1/Metal 3	Surface 2/Metal 4	Metal 1	Metal 2	V	mA
Good	Good	Good	Good	5.00	20
Failed	Good	Good	Good	4.50	18
Good	Failed	Good	Good	4.25	17
Failed	Failed	Good	Good	4.00	16
Good	Good	Failed	Good	3.75	15
Good	Good	Good	Failed	3.50	14
Good	Good	Failed	Failed	3.25	13
Failed	Good	Failed	Good	3.00	12
Good	Failed	Failed	Good	2.75	11
Failed	Failed	Failed	Good	2.50	10
Failed	Good	Good	Failed	2.25	9
Good	Failed	Good	Failed	2.00	8
Failed	Failed	Good	Failed	1.75	7
Failed	Good	Failed	Failed	1.50	6
Good	Failed	Failed	Failed	1.25	5
Failed	Failed	Failed	Failed	1.00	4

Modes of Operation

The 3M™ WS Aware Workstation Monitor can work in a stand-alone mode or be connected to a Data Acquisition (DAQ) or a Facility Monitoring System (FMS).

Stand-Alone Operation

Connect the WS Aware monitor according to previous instructions and plug its power adapter into a working wall outlet. Do not forget to properly ground the WS Aware monitor.

Your WS Aware monitor is now ready to inform you of problems of significance with personnel and equipment grounding.

In stand-alone mode, the WS Aware monitor is a great ESD awareness tool for workers, equipment operators, facility and contamination engineers. It can also be used as a part of hands-on ESD training that is essential for any successful ESD management program.

Operation with Data Acquisition (DAQ) or Facility Monitoring Systems (FMS)

System Requirements

DAQ or FMS must be able to sample data from each 3M™ WS Aware Workstation Monitor often enough in order not to miss intermittent grounding problems and to properly represent them.

3M can provide you with a portable or stationary DAQ Systems if you don't already have one—please contact the factory or an authorized distributor.

The WS Aware monitor has the following interface options: 4-20mA (-3 model) and MODBUS (-5 model). For other interface types, contact 3M.

The WS Aware monitor provides output signal via its RJ45 connector. LEDs on the connector are functional only with MODBUS interface.

➔ Do not plug the 3M™ WS Aware Workstation Monitor into your 10/100BaseT Ethernet factory network!

➔ Do not plug -3 version into -5 interface and vice versa—this may cause irreversible damage to the WS Aware monitor and your FMS.

If a long data cable is used, it is advisable to install ferrite clamp-on chokes on both ends of the cable in order to reduce electromagnetic interference induced on cables. Please contact the factory for proper selection of ferrite filters.

Pinout of RJ45 Connector

	4-20mA Interface	MODBUS
1	No connection	RXD0
2	No connection	RXD1
3	+12-24V	Optional PMC, Port Mode Control
4	No connection	TXD1/D1
5	No connection	TXD0/D0
6	Common	
7	Ground monitoring output	+12-24 V DC
8	Operator monitoring output	Common

Power Requirements

➔ **IMPORTANT:** For operating the 3M™ WS Aware Workstation Monitor with a power adapter, use only the adapter provided by the manufacturer. Operation with a power supply not provided by or expressly approved by 3M voids the warranty.

For powering the WS Aware monitor from DAQ or FMS, please follow the instructions below.

The WS Aware monitor requires clean DC voltage from 12V to 24V. Typical current consumption of each unit is less than 150mA. Power can be provided either via power jack or via the data cable (See ***Pinout of RJ45 Connector*** section). Please ensure that the power provided is reasonably free from spikes, EMI and other noise. In an installation where a power supply provides power to more than just WS Aware monitors, it is prudent to consider a separate power supply just for the network of WS Aware monitor units. Contact the factory for specific recommendations.

➔ **IMPORTANT:** DO NOT PROVIDE POWER SIMULTANEOUSLY FROM BOTH THE POWER JACK AND THE CABLE!

3M™ WS Aware Workstation Monitor

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 3M in writing, this information represents 3M's best knowledge and belief based upon information provided by third party suppliers to 3M.

This numerical reference should not be construed as a representation regarding the product's life or an extension of a product warranty. In the event any product is proven not to conform with

3M's Regulatory Information Sheet, then 3M's entire liability and buyer's exclusive remedy, will be at 3M's option either: (i) replacement of product with a conforming product, or (ii) refund of the purchase price paid by buyer for each non-conforming product, within a reasonable time after written notification of said non-conformance and return of said product to 3M. 3M shall not under any circumstances be liable for direct, incidental, special, or consequential damages (including but not limited to loss of profits, revenue, or business) related to or arising out of this certification, including, the use, misuse or inability to use the product. Unless stated otherwise in writing, the foregoing language cannot be waived, modified, or supplemented in any manner whatsoever.

产品中有毒有害物质或元素的名称及含量 **Name and Content of Hazardous Substances or Elements**

部件名称 (Part or Component Name)	有毒有害物质或元素 (Hazardous Substances or Elements)					
	铅 (Pb)	汞 (Hg)	镉 (Cd)	六价铬 Cr(VI)	多溴联苯 (PBB)	多溴二苯醚 (PBDE)
0602电容引脚 (Terminations in rcapacitor 0602)	×	○	○	○	○	○
钽电容引脚 (Termination in capacitor, tantalum)	×	○	○	○	○	○
二极管焊接部 (Solder in diode)	×	○	○	○	○	○
二极管电镀 (Finish in diode)	×	○	○	○	○	○
印刷电路板焊盘/安装孔 (Terminations in PCBs)	×	○	○	○	○	○
电阻引脚 (Terminations in resistors)	×	○	○	○	○	○
电阻电镀部 (Plating in resistors)	×	○	○	○	○	○
连接器 (Connector)	×	○	○	○	○	○

产品中有毒有害物质或元素的名称及含量 **Name and Content of Hazardous Substances or Elements**

部件名称 (Part or Component Name)	有毒有害物质或元素 (Hazardous Substances or Elements)					
	铅 (Pb)	汞 (Hg)	镉 (Cd)	六价铬 Cr(VI)	多溴联苯 (PBB)	多溴二苯醚 (PBDE)
电感器 (Inductor)	×	○	○	○	○	○
电磁干扰滤波器 (EMI filter)	×	○	○	○	○	○
装置的焊接部 (Solder in instrument)	×	○	○	○	○	○
IC焊接部 (Solder in IC)	×	○	○	○	○	○
蜂鸣器焊接部 (Solder in buzzer)	×	○	○	○	○	○

○: 表示该有毒有害物质在该部件所有均质材料中的含量均在SJ/T11363-2006 标准规定的限量要求以下。(Indicates that this hazardous substance contained in all of the homogeneous materials for this part is below the limit requirement in SJ/T11363-2006.)

×: 表示该有毒有害物质至少在该部件的某一均质材料中的含量超出SJ/T11363-2006 标准规定的限量要求。(Indicates that this hazardous substance contained in at least one of the homogeneous materials used for this part is above the limit requirement in SJ/T11363-2006.)

Important Notice

All statements, technical information, and recommendations related to 3M's products are based on information believed to be reliable, but the accuracy or completeness is not guaranteed. Before using this product, you must evaluate it and determine if it is suitable for your intended application. You assume all risks and liability associated with such use. Any statements related to the product which are not contained in 3M's current publications, or any contrary statements contained on your purchase order shall have no force or effect unless expressly agreed upon, in writing, by an authorized officer of 3M.

Warranty; Limited Remedy; Limited Liability.

This product will be free from defects in material and manufacture for a period of one (1) year from the time of purchase. **3M MAKES NO OTHER WARRANTIES INCLUDING, BUT NOT LIMITED TO, ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.**

If this product is defective within the warranty period stated above, your exclusive remedy shall be, at 3M's option, to replace or repair the 3M product or refund the purchase price of the 3M product. **Except where prohibited by law, 3M will not be liable for any indirect, special, incidental or consequential loss or damage arising from this 3M product, regardless of the legal theory asserted.**

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