



AIRBORNE PARTICLE MONITOR (APM)

MILLENNIUM PREMIUM - RELAY

USER MANUAL

ISO 9001:2000



Part Number: MAN-0064-00 Rev 6
January 2006

IMPORTANT INFORMATION

This manual is for informational purposes only. Although every effort has been made to ensure the correctness of the information, technical inaccuracies may occur and periodic changes may be made without notice. Net Safety Monitoring Inc., assumes no responsibility for any errors contained within this manual.

If the products or procedures are used for purposes other than as described in the manual, without receiving prior confirmation of validity or suitability, Net Safety Monitoring Inc., does not guarantee the results and assumes no obligation or liability.

No part of this manual may be copied, disseminated or distributed without the express written consent of Net Safety Monitoring Inc.

Net Safety Monitoring Inc., products are carefully designed and manufactured from high quality components and can be expected to provide many years of trouble free service. Each product is thoroughly tested, inspected and calibrated prior to shipment. Failures can occur which are beyond the control of the manufacturer. Failures can be minimized by adhering to the operating and maintenance instructions herein. Where the absolute greatest of reliability is required, redundancy should be designed into the system.

Warranty

Net Safety Monitoring Inc., warrants its APM against defective parts and workmanship for a period of 24 months from date of purchase; other electronic assemblies for 36 months from date of purchase.

No other warranties or liability, expressed or implied, will be honoured by Net Safety Monitoring Inc.

Contact Net Safety Monitoring Inc., or an authorized distributor for details.

We welcome your input at Net Safety Monitoring. If you have any comments please contact us at the phone/address below or visit our web site and complete our on-line customer survey: www.net-safety.com.

Contact Information

Net Safety Monitoring Inc.
2721 Hopewell Place NE
Calgary, AB
Canada
T1Y 7J7
Telephone: (403) 219-0688 Fax: (403) 219-0694
www.net-safety.com
E-mail: netsafe@net-safety.com

TABLE OF CONTENTS

Important Information

Warranty	
Contact Information	
Introduction	1
The Product	1
The Manual	1
Step 1 — Plan	2
Locate Controller/APM	2
Figure 1: Locate APM and Controller - Typical Installation	2
Open-Path 2	
Figure 2: Dimensional Drawing—Controller	3
Figure 3: Dimensional Drawing—APM and Junction Box	3
Step 2 — Install	4
Unpack	4
Figure 4: Components	4
The APM	4
The Controller	4
Step 3 — Wire	5
Field Installation	5
Seal	5
Mount	5
Connecting Wires	5
Board Assembly	5
Figure 5: Millennium Module Boards	6
Wiring—APM and Controller	6
Figure 6: Wiring—Controller and APM	7
Sensor and Controller	7
Table 1: Controller/APM Terminal Connections	7
Sensor Separation	8
Figure 7: Wiring—APM Separation	8
Figure 8: Jumper Position	9
Jumper Position	9
Non-Isolated/Isolated Current Output Power	9
Termination Jumper	9
Step 4 — Operate	10
Figure 9: Controller Functionality	10

Table 2: Status LEDs, Display Messages and Current Loop	11
Setup Button	11
Magnetic Reed Switch	11
The Main Menu	12
Accessing the Main Menu	12
Main Menu Functionality	12
Current Loop Measurement (Test Jacks)	12
Power Up	12
Step 5 — Zero	12
Step 6 — Monitor	13
Table 3: Display Messages	13
Sensitivity Settings	13
Set Relay Options	14
APM Fault	14
Alarms	14
Clean Window/Dirty Chamber	14
Smoke Alarm	14
Remote Reset	14
Manual Reset	14
Review Relay Settings	15
Normal	15
Outputs	15
Relays	15
Current	15
Step 7 — Maintain	15
Response Check	15
Troubleshoot	16
Cleaning	16
How to Return Equipment	16
Spare Parts/Accessories	17
Table 4: Part Numbering	17
Appendix A: Electrostatic Sensitive Device (ESD)	17
Appendix B: Resistance (ohms)	18
Appendix C: Specifications	19

INTRODUCTION

THE PRODUCT

The APM is an infrared optical detector, for use in hazardous industrial applications, which monitors ambient air for the presence of particulate matter from products of combustion such as carbon, smoke or ash.

The Millennium Controller is an environmentally protected electronic package contained within an explosion-proof housing. The scrolling 8-character display and status LEDs provide instructions and status alerts.

The APM is mounted where airborne particles are anticipated to accumulate while the Millennium Controller can be located conveniently at eye level.

THE MANUAL

The manual has been designed to make installation of the Millennium product easy. To ensure proper installation, follow the simple steps outlined in the following pages. If you encounter problems during operation, consult the troubleshooting section or contact your sales representative.

Step 1 — PLAN

Step 2 — INSTALL

Step 3 — WIRE

Step 4 — OPERATE

Step 5 — ZERO

Step 6 — MONITOR

Step 7 — MAINTAIN

STEP 1 — PLAN

LOCATE CONTROLLER/APM

Prior to the installation process, a location plan for placing the Controller and APM should be developed. Proper location of the APM is essential for providing maximum protection. The most effective placement and number of detectors varies depending upon conditions. The following points should be considered when planning the installation.

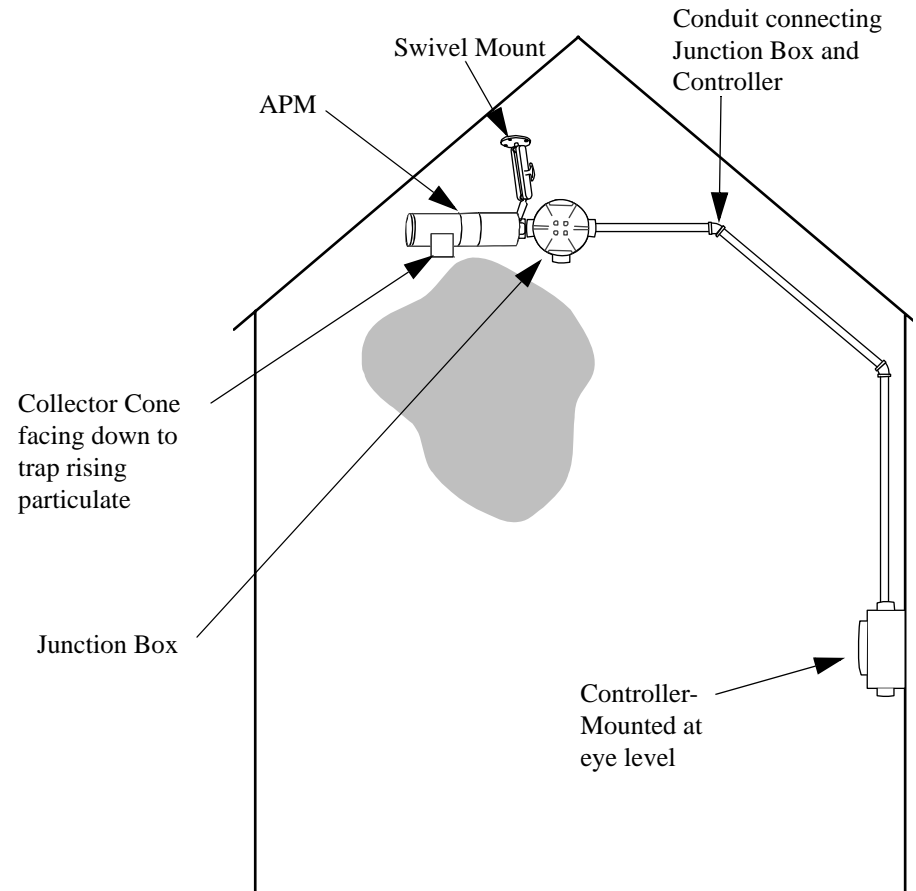
- Carefully locate the APM in an area where particulate may potentially accumulate.
- The APM should be located where it is safe from potential sources of contamination such as oil film, dirt, etc.
- Locate the Controller where it will be accessible and visible.
- Face the Collector Cone of the APM chamber downward so as to trap particulate rising by convection.
- If the particulate is expected to be moving horizontally, due to air currents, orient the Collector Cone for maximum detection.
- Exposure to excessive heat or vibration can cause premature failure of electronic devices and should be avoided whenever possible.
- Seek advice from experts and refer to various regulatory publications that discuss general guidelines for your industry.

Note: If used for the detection of smoke refer to NFPA 72 guidelines (National Fire Protection Association www.nfpa.org).

The following illustrates a typical installation of an APM and Controller.

The APM is mounted separate from the Controller using a Junction Box. The Controller is located at eye-level, while the APM is located where particles are most likely to accumulate. Conduit then connects the two devices. See "Wiring—APM and Controller" on page 7 for detailed wiring instructions.

Figure 1: Locate APM and Controller - Typical Installation



Note: The APM can either be mounted via swivel mount or rigid conduit.

Open-Path

An optional "Open Path" unit (does not have a baffle/collector cone) is available. The Open Path APM design is intended for installations with strong air flows. Mount the Open Path APM so that air current allows particulate matter to flow into the sensor.

When installing, ensure no light source is directed at the internal sensor.

Figure 2: Dimensional Drawing—Controller

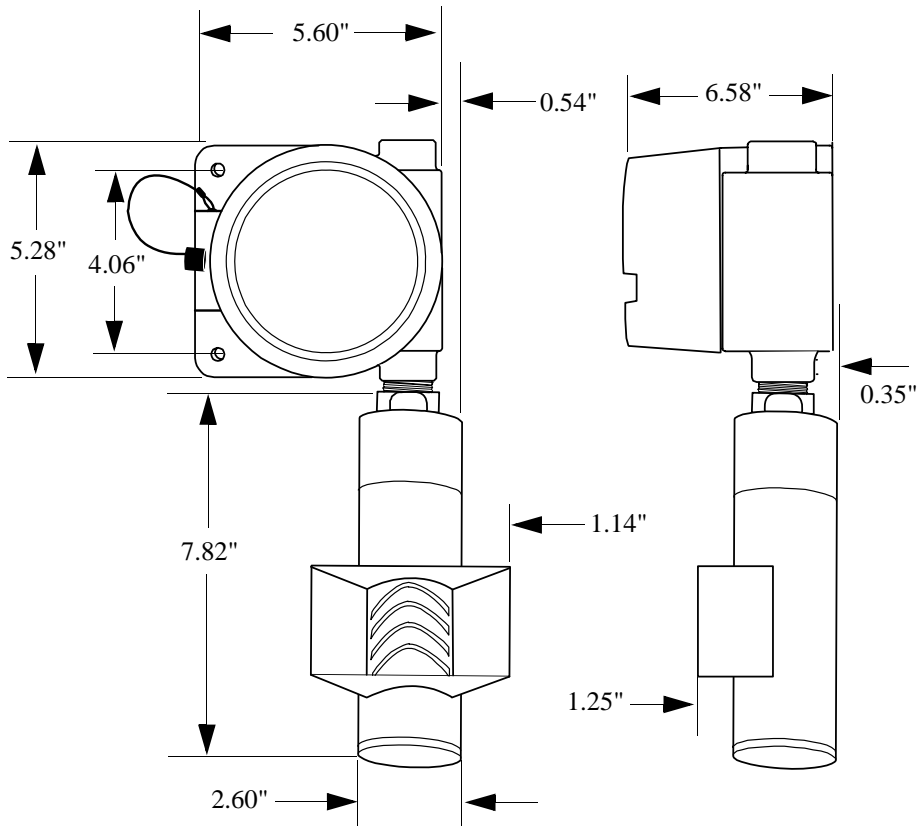
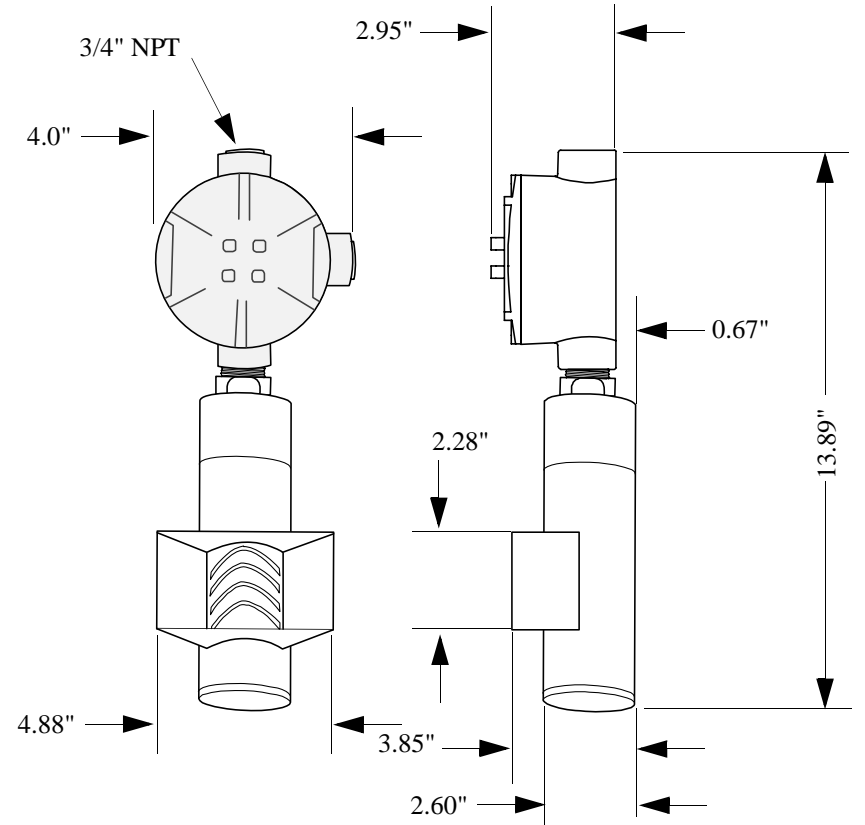


Figure 3: Dimensional Drawing—APM and Junction Box



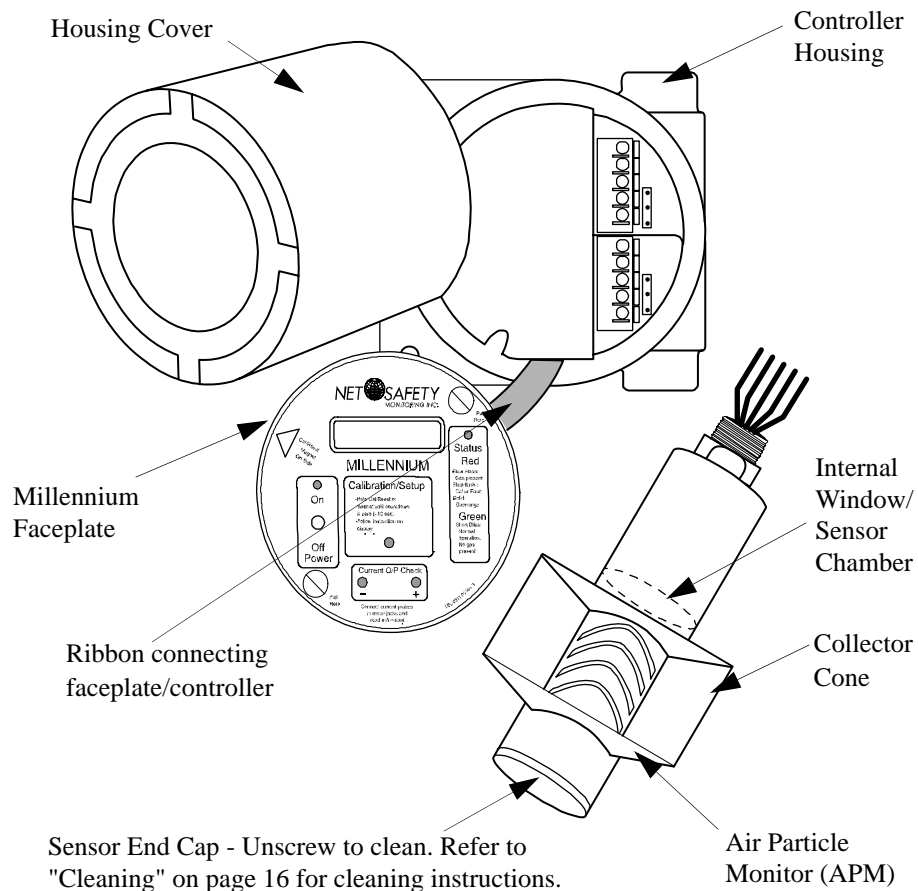
STEP 2 — INSTALL

UNPACK

Carefully remove all components from the packaging. Check components against the enclosed packing list and inspect all components for obvious damage such as broken or loose parts.

If you find any components missing or damaged, notify the distributor or Net Safety Monitoring immediately.

Figure 4: Components



THE APM

The APM monitors for airborne products of combustion such as carbon, smoke or ash.

THE CONTROLLER

The Millennium Controller has an explosion-proof Housing, rated Class 1, Division 1, Groups B, C, and D for hazardous applications.

To remove the Housing cover, simply screw the cover counter clockwise.

STEP 3 — WIRE

FIELD INSTALLATION

WARNING:

Wiring codes and regulations may vary. Compliance with regulations is the responsibility of the installer. Wiring must comply with applicable regulations relating to the installation of electrical equipment in a hazardous area. If in doubt, consult a qualified official before wiring the system.

- If the 4-20 mA signal is not used, connect a jumper between the 4-20 terminal and the Common terminal.
- The use of shielded cable is highly recommended for signal, input, output and power wires to protect against interference caused by extraneous electrical or electromagnetic 'noise'.
- In applications where the wiring cable is installed in conduit, the conduit must not be used for wiring to other electrical equipment.
- The maximum distance between the APM and Controller is limited by the resistance of the connecting wiring, which is a function of the gauge of the wire being used.
- The Controller contains semiconductor devices susceptible to damage by electrostatic discharge. Use caution when handling. For more information on proper ESD handling, refer to Appendix A, " Electrostatic Sensitive Device (ESD)", on page 18.

SEAL

- Water-proof and explosion-proof conduit seals are recommended to prevent water accumulation within the enclosure.
- Seals should be located as close to the device as possible and not more than 18 inches (46 cm) away.
- Explosion-proof installations may require an additional seal where conduit enters a non-hazardous area. Ensure conformity with local wiring codes.
- When pouring a seal, use a fibre dam to assure proper formation of the seal. Seals should never be poured at temperatures below freezing.

- The jacket and shielding of the cable should be stripped back to permit the seal to form around the individual wires. This will prevent air, particles and water leakage through the inside of the shield and into the enclosure.
- It is recommended that explosion-proof drains and conduit breathers be used. In some applications, alternate changes in temperature and barometric pressure can cause 'breathing' which allows moist air to enter and circulate inside the conduit. Joints in the conduit system are seldom tight enough to prevent this 'breathing'.

MOUNT

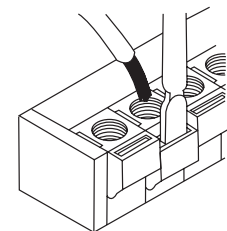
The Controller should be mounted at eye-level and be easily accessible for monitoring and maintenance purposes. The APM should be placed where particles are likely to accumulate and with the Collector Cone pointed in the appropriate direction.

To prevent water damage, seal conduit at all points of entry to the Controller or Junction Box.

Note: Seals are not required for all Class 1 Division 2 locations in Canada. However, to fully avoid any exposure, the use of seals are still recommended, especially for installations that use high-pressure or steam cleaning devices in proximity to the controller and/or sensor.

Connecting Wires

1. Use a small screw driver to gently press down and hold the spring connector open.
2. Insert appropriate wire into open connector hole.
3. Release screw driver to secure wire.



Board Assembly

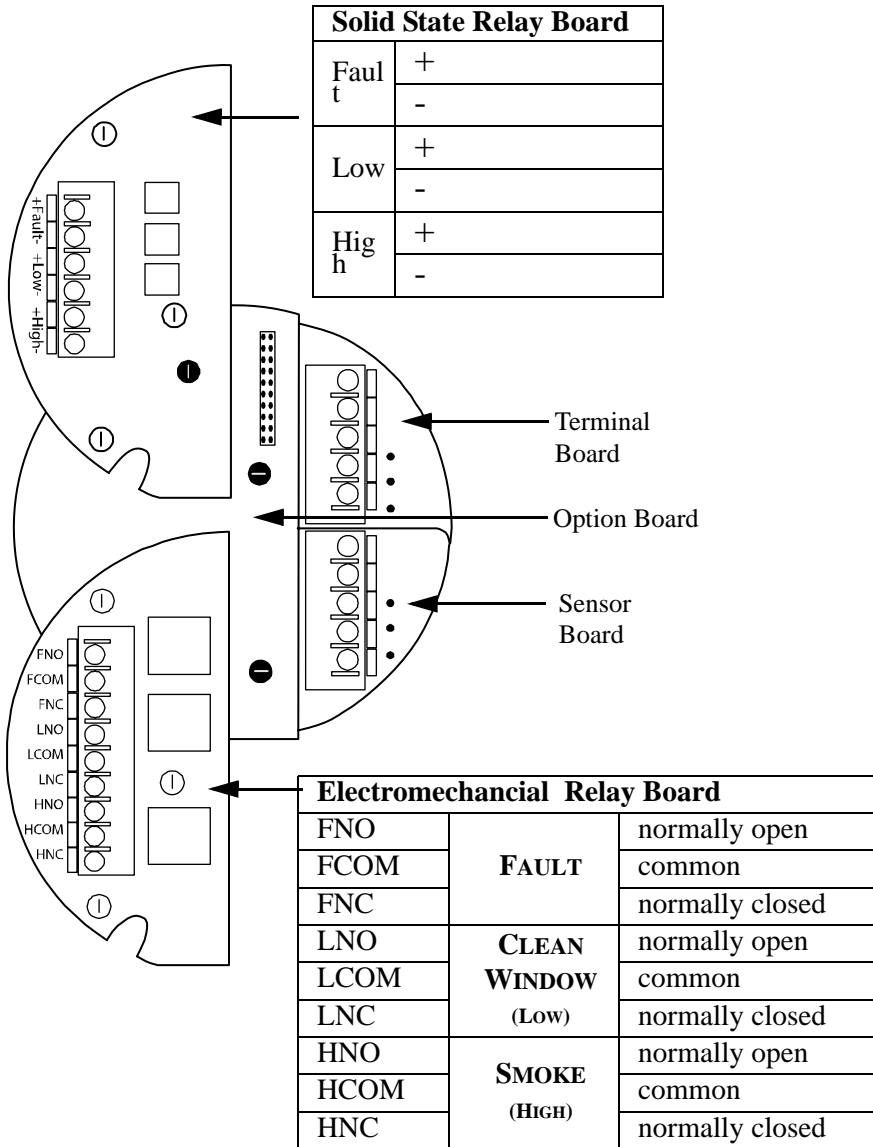
There are three different fixed boards and two optional relay boards which make up the PCB Assembly. Depending upon requirements, either a Electromechanical or Solid State Relay Board module can be used in the Millennium Controller. Simply loosen the three locking standoffs, remove one board, insert the other board and tighten screws.

Note: Boards are susceptible to ESD. Refer to Appendix A, " Electrostatic

Sensitive Device (ESD)", on page 18.

Figure 1: Millennium Module Boards

Note: Refer to "Set Relay Options" on page 14 for specifics on defining alarm conditions and .



WIRING—APM AND CONTROLLER

WARNING:

Power to the unit must be OFF before wiring.

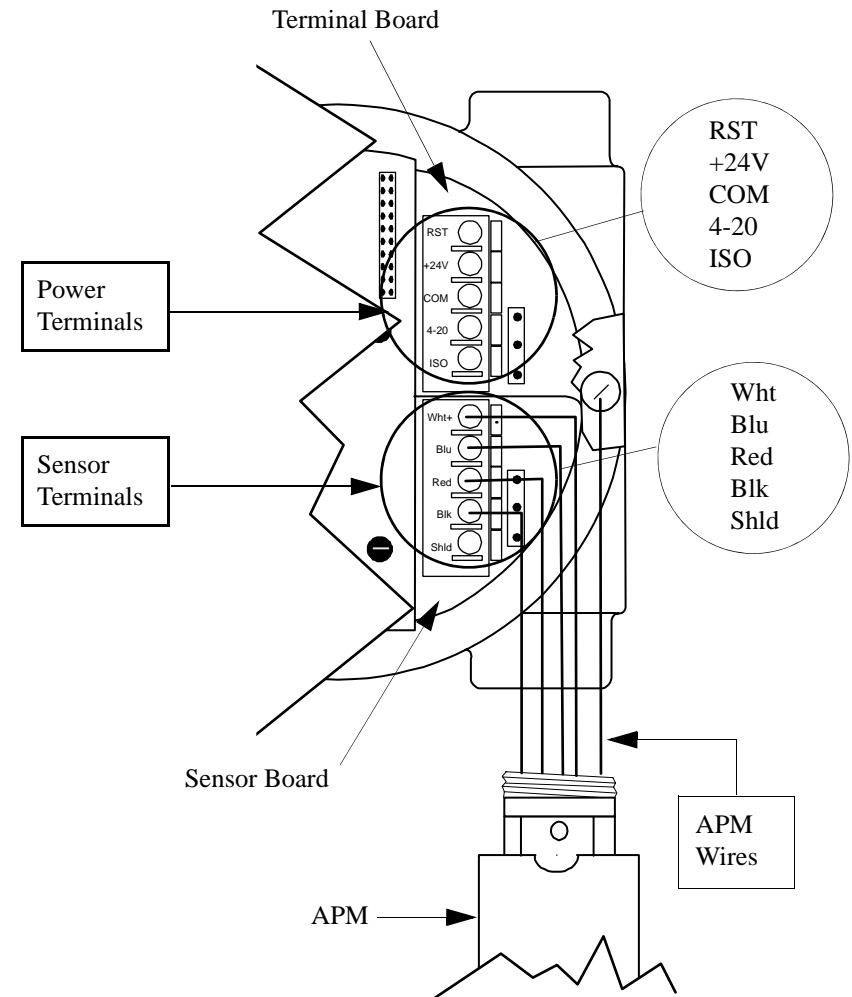
As the APM must be located where particles are likely to accumulate and the Controller where it can be easily reached, it is necessary to “separate” the Controller and APM.

The APM separation kit (JB2-4-ASSY) is composed of a junction box and terminal strip. Refer to Figure 1, "Locate APM and Controller - Typical Installation", on page 2 for an example.

Shielded copper instrument wire (minimum 18 AWG) should be used for separations up to 1000 feet. Shielded copper instrument wire (minimum 16 AWG) should be used for separations up to 2000 feet. Contact Net Safety if separation above 2000 feet is required.

Ensure that the appropriate wire is used for the Class 1/Division 1, hazardous applications.

Figure 2: Wiring—Controller and APM



Note: If the 4-20 mA signal is not used, connect a jumper between the 4-20 terminal and the COM terminal on the Terminal Board.

SENSOR AND CONTROLLER

WARNING: 

Power to the unit must be OFF before wiring.

Note: The APM may be factory installed to the Controller. If so, you need only connect the Power Terminals.

4. Remove the Controller's Housing Cover.
5. Connect the APM to the Sensor Terminals (if necessary) and the Output Terminals to the output signal wires.

Table 1: Controller/APM Terminal Connections

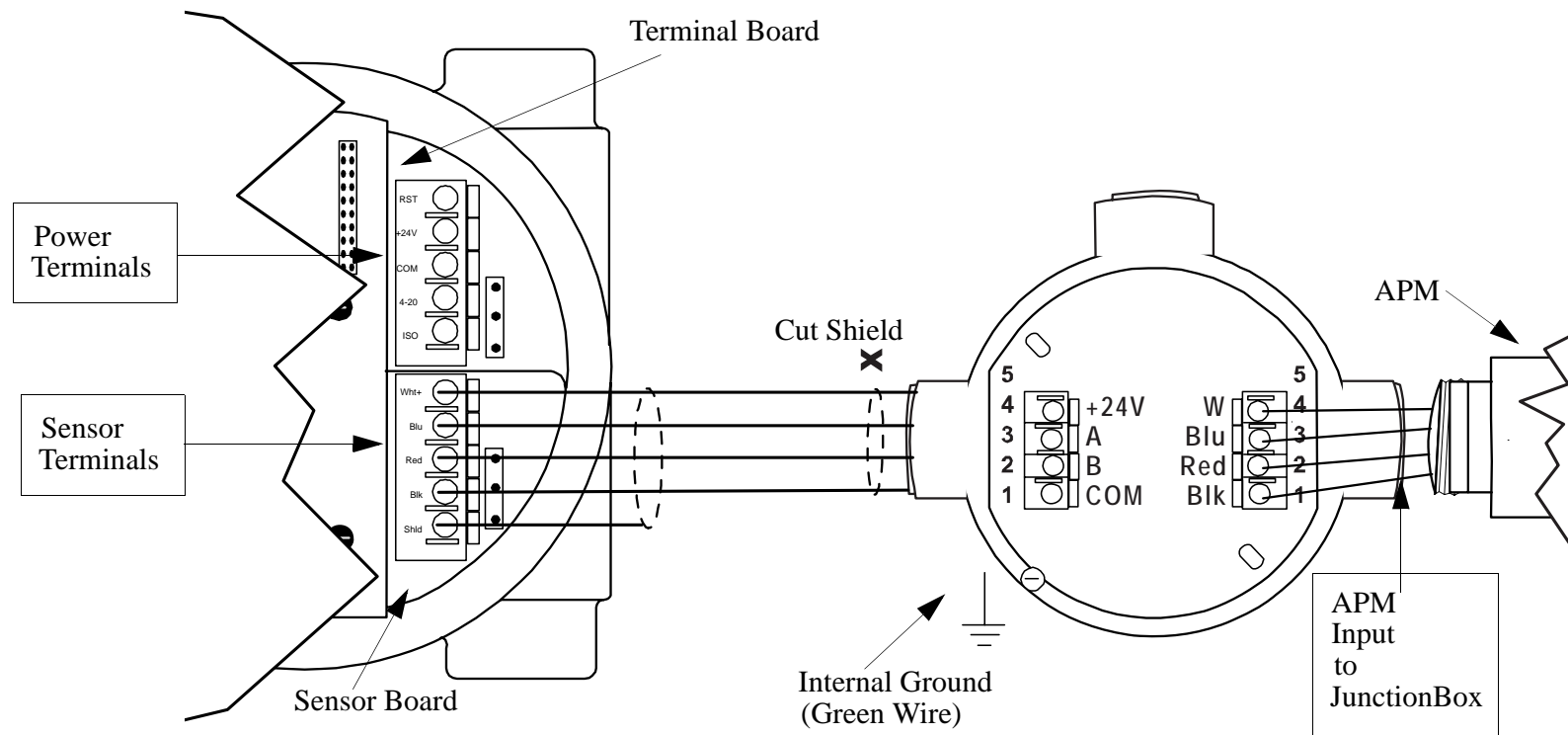
Sensor Terminals		Power Terminals	
APM Wire		Controller (Terminal Board)	Power Connections
White	=	+24V	
Blue	=	Sig A	
Red	=	Sig B	
Black	=	COM (-)	
Shield		Shld	
		RST	= Remote Reset
		+24V	= Power (+)
		COM	= Power (-)
		4-20	= Current Loop Output
		ISO	= +24 V isolated 4-20 power

Note: For APM Separation instructions, see Figure 3, "Wiring—APM Separation", on page 9.

6. Replace the Controller's Housing Cover.
7. Turn Controller On.
8. Ensure display reads **Start Delay**, Status LED is Red Slow Flash and current output displays 3.0 mA. This is the start-up delay sequence which will last approximately 90 seconds.

SENSOR SEPARATION

Figure 3: Wiring—APM Separation



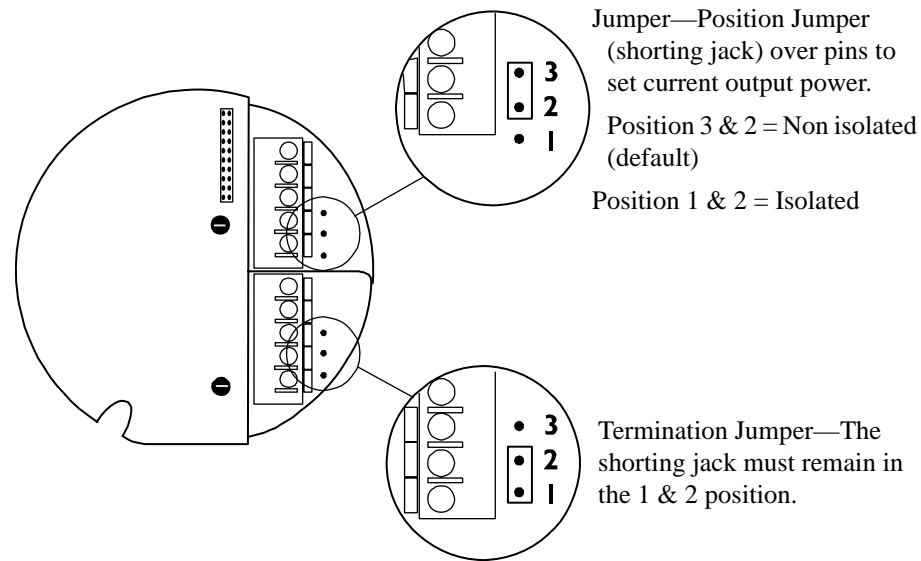
As the Sensor must be located where gas is likely to accumulate and the Controller where it can be easily reached, it is often necessary to “separate” the Controller and Sensor. The Sensor separation kit (SEP) is composed of a junction box and terminal strip. Refer to Option 1, Figure 1, "Locate APM and Controller - Typical Installation", on page 2 for an example.

Shielded copper instrument wire (minimum 18 AWG) should be used for separations up to 500 feet. Shielded copper instrument wire (minimum 16 AWG) should be used for separations up to 2000 feet. Consult the factory if a greater separation distance is required.

Note: Refer to Table 1, "Controller/APM Terminal Connections", on page 8 for Terminal definitions.

Note: If the 4-20 mA signal is not used, connect a jumper between the 4-20 terminal and the COM terminal on the Terminal Board.

Figure 5: Jumper Position



JUMPER POSITION

Non-Isolated/Isolated Current Output Power

To set an isolated current output power, simply move the Jumper (shorting jack) to either the isolated or non-isolated current position (refer to Figure 5, "Jumper Position", on page 10).

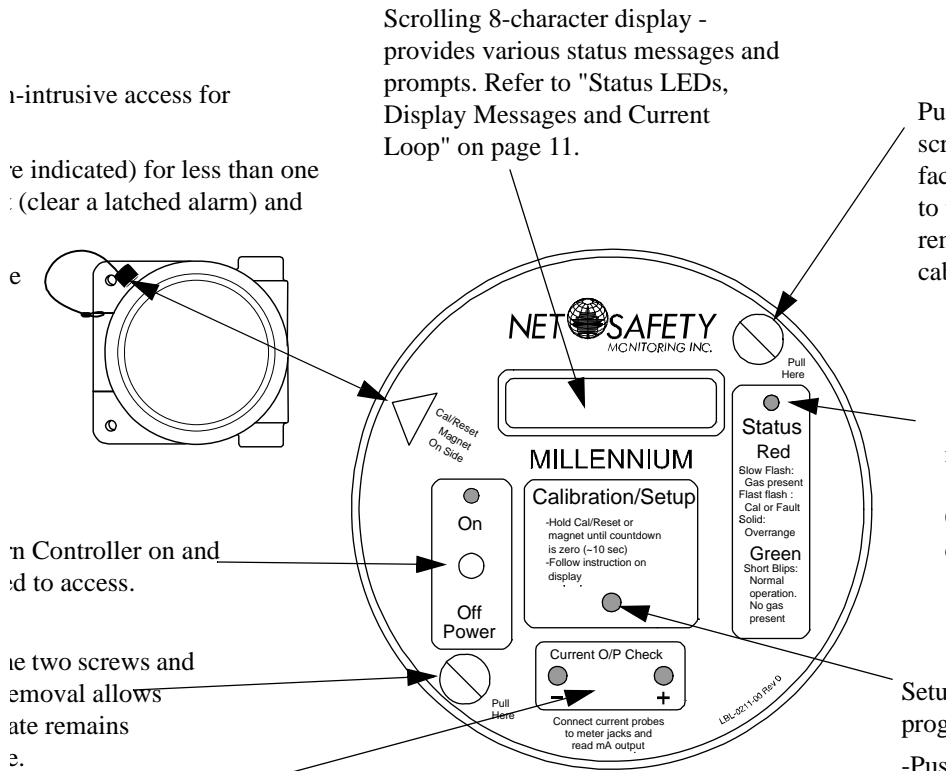
Note: Unless otherwise specified, all models ship with non-Isolated as the default.

Termination Jumper

The shorting jack must remain in the 1 & 2 pin position on the Termination Jumper as it is used for RS485 termination.

STEP 4 — OPERATE

Figure 6: Controller Functionality



intrusive access for

(clear a latched alarm) and

Controller on and

Remove two screws and

Test jacks to facilitate current loop measurements without opening the external

current loop measurements use the following procedure:

1. Connect leads into the test jacks.

2. Bypass, if necessary, to avoid unwanted alarm response

3. Refer to "Measurement (Test Jacks)" on page 13.

Table 1: Status LEDs, Display Messages and Current Loop

State	Current O/P	Status LED		Display
		RED or GREEN		
Main Menu Sensitivity Settings Set Relay Options Set Zero Review Settings	3.0 mA	Blank		n/a
Normal operation	4.0 mA		Blip/ blink	Clear
Start-up delay (90 sec)	3.0 mA	Slow flash		Start Delay
Sensor Chamber is Dirty (Clean Window alarm)	3.3 mA	Fast flash		Dirty Chamber
Particles present (Smoke Alarm)	20 mA	Blip		Smoke
Fault condition	2.5 mA	Fast flash		Fault

SETUP BUTTON

The Setup Button provides access to the Millennium's Main Menu, which in turn allows options to be reviewed and set. The Setup Button is also used to zero the Controller. As the Controller's housing must be open to access the switch, the area must be de-classified before using.

- Press and hold the Setup Button to zero and access Main Menu.
- Briefly press to make a selection (select **YES?**).

MAGNETIC REED SWITCH

The Magnetic Reed Switch is provided to avoid opening the Housing in an environment where gas may be present. The Magnetic Reed Switch functions in the same manner as the Setup Button but in a non-intrusive manner.

Attached to the side of the Controller is a magnet:

- Place and hold the magnet to the Controller's Housing (10 o'clock position) to zero and access Main Menu.
- Briefly place the magnet to the Controller's Housing (10 o'clock position) to make a selection (select **YES?**).

WARNING: 

Opening the Controller's Housing should be avoided when the presence of gas is possible (when in a hazardous environment). Do not power up the system, with the Housing removed, unless the area has been de-classified.

THE MAIN MENU

The Controller must be powered up before the Main Menu is displayed (see "Power Up" on page 13).

The Main Menu provides access to various functional settings and viewing of current settings.

- Set Zero - The unit adjusts to current environment.
- Sensitivity Settings - Set to low, medium or high sensitivity levels.
- Review Relay Settings - Review the current Fault, Clean Window and Smoke Alarm settings.
- Set Relay Options - Select the settings for the Clean Window and Smoke Alarms. The Fault Alarm setting is fixed.
- Select Display Language - Choose from English, French or Spanish.

Accessing the Main Menu

There are two ways to activate the Main Menu:

- Setup Button found on the faceplate (the Housing cover must be removed to access)
- Magnetic Reed Switch (a magnet must be used to activate)

Main Menu Functionality

1. Ensure that the Controller has been turned on and no fault is present.
2. Hold the magnet against the Reed Switch or press and hold the Setup Button until the message **Switch On** displays and the countdown (10 to 0) finishes.
3. An option will scroll across the display followed by the prompt **YES?**.
4. To set/view an option, momentarily place the magnet to the Reed Switch or press the Setup Button at the **YES?** prompt.
5. If you do not wish to select that option wait until the next option appears and then select **YES?**.
6. A selection is acknowledged with a flashing **YES**.
7. If no option is selected, the Controller returns to **Clear** (normal operation).

CURRENT LOOP MEASUREMENT (TEST JACKS)

Use a standard meter to measure current loop during various states. The Controller’s Housing cover must be removed to access the Test Jacks.

POWER UP

When power is first applied, a 90 second warm-up routine will begin. During this time, and message **Start Delay Millennium Net Safety** will display, the Status LED will Red Slow Flash and the output displays 3.0 mA.

After the 90-second warm-up, the Controller will enter normal operation; the message **Clear** displays, the Status LED will Green Blip/blink and analog output displays 4.0 mA.

STEP 5 — ZERO

Note: It will take approximately 1 minute to complete the Zero procedure.

The Controller should be zeroed to site background particulate levels. If at any time the background particulate levels change, zero to the new levels.

After initial power-up, run the unit for 2-4 hours before zeroing.

Be sure the APM is powered-up and is not indicating a fault; display reads **Clear** and Status LED will Green Blip/blink.

Step 1: Ensure that the sensor is in a normal air environment before beginning the procedure. If the input device is another transmitter, be sure that it is calibrated and that the input to APM is 4.0 mA.

Step 2: Press and hold the Setup Button or the magnet to the Reed Switch to enter the Main Menu; wait for the countdown, from 10 to 0, to end.

Step 3: Release the Setup Button or remove the magnet from the Reed Switch.

Step 4: When **Set Zero YES?** displays press the Setup Button or use the Reed Switch to select. The flashing **YES** confirms the selection.

Step 5: The APM has now been zeroed meaning that the existing level of air contamination is considered normal.

STEP 6 — MONITOR

Table 2: Display Messages

Message	Meaning
Start Delay Millennium Net Safety	Power up sequence in progress
Switch On	Setup Button or Reed Switch active
Fault	Fault Alarm-Sensor or sensor wiring fault
Smoke	Smoke Alarm-Particulate matter detected
Dirty Chamber	Clean Window Alarm-Clean chamber
Clear	No particulate present and no fault detected
Set Zero YES?	Set zero level of Controller
Set Relay Options YES?	Set Smoke Alarm Relay
Review Relay Settings YES?	Review current functional settings
Sensitivity Settings YES?	Set to high, medium or low sensitivity level
Coil Status Energized/de-energized	Set for Fault, Clean Window or Smoke alarm
Latch Status Latching/non-latching	Set for Fault, Clean Window or Smoke alarm

SENSITIVITY SETTINGS

The APM can be set to detect low, medium or high sensitivity levels with high being the most sensitive.

- Step 1:** Press and hold the Setup Button or the magnet to the Reed Switch to enter the Main Menu; wait for the countdown, from 10 to 0, to end.
- Step 2:** When **Sensitivity Settings YES?** displays press the Setup Button or use the Reed Switch to select.
The flashing **YES** confirms the selection.
- Step 3:** The following three options will display:
Low Sensitivity YES?; Medium Sensitivity YES?; and High Sensitivity YES?.
When the required setting is displayed, press the Setup Button or use the Reed Switch to select.
The selection is acknowledged with flashing **YES**.

Note: Disconnect the sensor from all output devices actuated by the sensor system to prevent unwanted activation of any equipment, and remember to place these same output devices back into service when the check is complete.

SET RELAY OPTIONS

Define relay settings for Clean Window and Smoke alarm conditions. Fault is fixed as energized/non-latching and cannot be changed.

- Step 1:** Press and hold the Setup Button or the magnet to the Reed Switch to enter the Main Menu; wait for the countdown, from 10 to 0, to end.
- Step 2:** When **Set Relay Options YES?** displays press the Setup Button or use the Reed Switch to select. The flashing **YES** confirms the selection. The current output drops to 3.0 mA and the micro-processor begins the relay setting procedure.

Coil energization can now be set for the Clean Window Alarm.

- Step 3:** The message **Coil Status** displays and then shows **Energized YES?.**
- Step 4:** Press the Setup Button or use the Reed Switch to select or wait for next selection option.
If selected, acknowledged with flashing **YES**.
- Step 5:** The display now shows **De-Energized YES?.**
- Step 6:** Press the Setup Button or use the Reed Switch to select.
The selection is acknowledged with flashing **YES**.

Latching condition can now be set for the Clean Window Alarm.

- Step 7:** The message **Latch Status** displays and then shows **Latching YES?.**
- Step 8:** Press the Setup Button or use the Reed Switch to select or wait for the next selection option.
If selected, acknowledged with flashing **YES**.
- Step 9:** The display now shows **Non-Latching YES?.**
- Step 10:** Press the Setup Button or use the Reed Switch to select.
The selection is acknowledged with flashing **YES**.
- Step 11:** Now repeat Steps 3 through 10 to set the Coil and Latch Status for the Smoke Alarm.

APM FAULT

To ensure proper response, the Millennium features self-testing circuitry that continuously checks for problems. When power is applied, the system automatically begins a test to ensure proper functionality.

During normal operation, it continuously monitors the signal from the internal APM source. In addition, a "watchdog" timer is maintained to ensure the program is running correctly.

Note: The fault detection circuitry does not monitor any external response equipment. It is important that these devices be checked periodically to ensure they are operational.

ALARMS

Clean Window/Dirty Chamber

Over an extended period, oily film or particulate build-up may obscure the Infrared (IR) detector. When dirty, the Clean Window alarm will trip, the message **Dirty Chamber** displays, the Status LED will Red Fast Flash and current output displays 3.3 mA. Refer to "Sensitivity Settings" on page 14 to define the Clean Window sensitivity and "Cleaning" on page 16 for instructions on cleaning.

Smoke Alarm

With particulate present in the APM chamber the message **Smoke** displays, the Status LED will Red Blip and the analog output displays 20.0 mA.

If the relay has been set to Non-**Latching**, the unit will reset itself; if set to **Latching**, a Manual Reset is required to clear the alarm condition.

Remote Reset

The Millennium is capable of remote reset. A normally open Push Button Switch must be connected between the RST terminal and the COM terminal on the terminal board. If relay is set to **Latching**, a Remote Reset is possible.

Manual Reset

If relay is set to **Latching**, a Manual Reset is required to clear the alarm condition. Simply place and hold the Magnet against the Reed Switch or press and hold the Setup Button for 3-5 seconds. The unit will return to the normal operation.

REVIEW RELAY SETTINGS

This is a **read-only mode**; changes cannot be made.

- Step 1:** Press and hold the Setup Button or the magnet to the Reed Switch to enter the Main Menu; wait for the countdown, from 10 to 0, to end.
- Step 2:** When **Review Relay Settings** displays press the Setup Button or use the Reed Switch to select. The flashing **YES** confirms the selection. The output current drops to 3.0 mA and the settings are displayed.
- Step 3:** Sensitivity Settings, Fault alarm settings (**fixed** as normally "**Energized**" and "**Non-Latching**"), Clean Window and Smoke alarm settings are displayed in sequence.
- Step 4:** At this point, the option to **Set Relay Options YES?** is given.

NORMAL

With no particles present and no fault detected, display reads **Clear**, Status LED will Green Blip/blink and analog output displays 4.0 mA.

OUTPUTS

Relays

All relay outputs have Form C SPDT contacts rated 5 amperes at 30 V dc/250 V ac.

Current

A 4-20 mA dc current output is used to transmit the alarm status and fault codes to other devices. This output can be wired for isolated or non-isolated operation. A 4.0 mA output indicates normal operation; a 20.0 mA output indicates that the smoke alarm threshold has been exceeded. Current output of 2.5 mA indicates the presence of a system fault. Current output of 3.3 mA indicates a build-up of particulate in the sensor chamber.

STEP 7 — MAINTAIN

RESPONSE CHECK

It is recommended that the APM be checked at least once every two months.

1. Spray Smoke Detector Tester™ (or equivalent product) in the direction of the collector cone from a distance of two to four feet. Typically, a one to two second burst is adequate to initiate an alarm level.
2. The display should read **Smoke** and Status LED should Red Blip to indicate detection of smoke or canned contaminant.
3. Zero the APM and ensure alarms have cleared.

Note: The overuse of artificial smoke or spraying from too close range may impair the operation of the APM due to the accumulation of an oily film on the internal window.

TROUBLESHOOT

The Millennium is not designed to be repaired in the field. If a problem should develop carefully check for faulty wiring. If it is determined that the problem is caused by an electronic defect, the device must be returned to the factory for repair (refer to "How to Return Equipment" on page 17 for instructions).

Regular checks of the unit should be completed every 2-3 months (refer to "Response Check" on page 16 for instructions).

CLEANING

When the **Dirty Chamber** or **Smoke** messages display, the internal window may require cleaning.

1. Turn off power to the unit.
2. Unscrew the Sensor End Cap of the APM.
3. Using the included window cleaning kit (part number HDW-0061), clean the front side of the window (found inside the Sensor Chamber of the APM).
4. Confirm that there is no residue left on the window or the inside portion of the End Cap.
5. Screw the End Cap back onto the bottom of the APM.
6. Return power to the APM and check for normal operation.
7. Complete the Zero procedure to establish new settings.
8. If a problem with the APM is still evident refer to "How to Return Equipment" on page 17.

HOW TO RETURN EQUIPMENT

A Material Return Authorization number is required in order to return equipment. Please contact Net Safety Monitoring at **(403) 219-0688** before returning equipment or consult our Service Department to possibly avoid returning equipment.

If you are required to return equipment, include the following information:

1. A Material Return Authorization number (provided over the phone to you by Net Safety).
2. A detailed description of the problem. The more specific you are regarding the problem, the quicker our Service department can determine and correct the problem.
3. A company name, contact name and telephone number.
4. A Purchase Order, from your company, authorizing repairs or request for quote.
5. Ship all equipment, prepaid to:

Net Safety Monitoring Inc
2721 Hopewell Place NE
Calgary, Alberta, Canada
T1Y 7J7

6. Mark all packages: **RETURN for REPAIR**

Waybills, for shipments from outside Canada, must state:

Equipment being returned for repair
All charges to be billed to the sender

Also, please ensure a duplicate copy of the packing slip is enclosed inside the box indicating item 1-4 along with the courier and account number for returning the goods.

All Equipment must be Shipped prepaid. Collect shipments will not be accepted.

Pack items to protect them from damage and use anti-static bags or aluminum-backed cardboard as protection from electrostatic discharge.

SPARE PARTS/ACCESSORIES

Table 3: Part Numbering

Description	Net Safety Part Number
Separation Kit	JB2-4-ASSY
Window Cleaning Kit	HDW-0061
Open Path Unit	MLP-AR-APM-OP-SEP

Appendix A:

ELECTROSTATIC SENSITIVE DEVICE (ESD)

Electrostatic discharge (ESD) is the transfer, between bodies, of an electrostatic charge caused by direct contact or induced by an electrostatic field.

The most common cause of ESD is physical contact. Touching an object can cause a discharge of electrostatic energy—ESD! If the charge is sufficient and occurs near electronic components, it can damage or destroy those components.

In some cases, damage is instantaneous and an immediate malfunction occurs. However, symptoms are not always immediate—performance may be marginal or seemingly normal for an indefinite period of time, followed by a sudden failure.

To eliminate potential ESD damage, review the following guidelines:

- Handle boards by metal shields—taking care not to touch electronic components
- Wear grounded wrist or foot straps, or ESD shoes or heel grounders to dissipate unwanted static energy
- Prior to handling boards, dispel any charge in your body or equipment
- Ensure components are transported and stored in static safe packaging
- When returning boards, carefully package in the original carton and static protective wrapping
- Ensure ALL personnel are educated and trained in ESD Control Procedures

In general, exercise accepted and proven precautions normally observed when handling electrostatic sensitive devices.

A warning label is placed on the packaging, identifying product using electrostatic sensitive semiconductor devices.



Appendix B: RESISTANCE (OHMS)

DISTANCE (feet)	AWG #20	AWG #18	AWG #16	AWG #14	AWG #12	AWG #10	AWG #8
100	1.02	0.64	0.4	0.25	0.16	0.1	0.06
200	2.03	1.28	0.8	0.51	0.32	0.2	0.13
300	3.05	1.92	1.2	0.76	0.48	0.3	0.19
400	4.06	2.55	1.61	1.01	0.64	0.4	0.25
500	5.08	3.2	2.01	1.26	0.79	0.5	0.31
600	6.09	3.83	2.41	1.52	0.95	0.6	0.38
700	7.11	4.47	2.81	1.77	1.11	0.7	0.44
800	8.12	5.11	3.21	2.02	1.27	0.8	0.5
900	9.14	5.75	3.61	2.27	1.43	0.9	0.57
1000	10.2	6.39	4.02	2.53	1.59	1.09	0.63
1250	12.7	7.99	5.03	3.16	1.99	1.25	0.79
1500	15.2	9.58	6.02	3.79	2.38	1.5	0.94
1750	17.8	11.2	7.03	4.42	2.78	1.75	1.1
2000	20.3	12.8	8.03	5.05	3.18	2	1.26

Note: Resistance shown is one way. This figure should be doubled when determining closed loop resistance.

Appendix C: SPECIFICATIONS

APM SPECIFICATIONS

- Operating Temperature Range: -40°C to +85°C (-40F to +185F)
- Power Consumption: 2.5 W (AMP only)
- Weight: 0.9 Kg (2.0 lb)
- Enclosure Material: Aluminum

- Certifications:

CSA and NRTL/C certified for hazardous locations Class I, Division 1 Groups B, C and D, temperature code T5.
IEC Rating Ex d IIB+H2 T5,
NEMA 4X

CONTROLLER SPECIFICATIONS

Millennium Controller	Premium Relay
Operating Temperature Range	-40°C to +85°C (-40F to +185F)
Power Consumption (at 12 V dc)	Maximum 3.24 W (with APM)
Power Consumption (at 24 V dc)	Maximum 3.6 W (with APM)
Humidity Range	0 to 100% Relative humidity, non-condensing
Operating Voltage Range	10.5 to 32.0 V dc when measured at the field controller
Enclosure Material	Copper Free Cast Aluminum
Certifications	CSA and NRTL/C certified for hazardous locations. Class I, Division 1, Groups B, C and D T4A, Type 4X. IEC Rating Ex d II B T4, maximum 85°C.
	NOTE: Electronics only - CSA and NRTL/C certified for hazardous locations Class I, Division 2 Groups A, B, C and D.
Weight (with APM)	4 lbs
Current Output	4 to 20 mA - Into a maximum loop impedance of 800 Ohms at 32 V dc or 150 Ohms at 10.5 V dc. Isolated or non-isolated loop supply.
Intrusive Calibration	Yes

Net Safety Monitoring Inc.,
2721 Hopewell Place NE
Calgary, Alberta, Canada T1Y 7J7
Telephone: (403) 219-0688 Fax: (403) 219-0694
E-mail: netsafe@net-safety.com
www.netsafety.com

Distributed by:

